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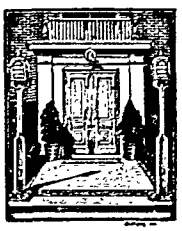
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Volume 10

1956 Edition

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Here and There in this Volume

AT ODD TIMES when you are just looking for "something interesting to read," without any special plan in mind, this list will help you. With this as a guide, you may visit faraway countries, watch people at their work and play, meet famous persons of ancient and modern times, review history's most brilliant incidents, explore the marvels of nature and science, play games—in short, find whatever suits your fancy of the moment. This list is not intended to serve as a table of contents, an index, or a study guide. For these purposes consult the Fact-Index and the Reference-Outlines.

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KEY TO PRONUNCIATION

Pronunciations have been indicated in the body of this work only for words which present special difficulties. For the pronunciation of other words, consult the Fact-Index. Marked letters are sounded as in the following words: cāpe, ăt, fär, fȧst, whạt, fạll; mē, yĕt, fẽrn, thêre; īce, bĭt; rōw, wȯn, fôr, nŏt, dọ; cūre, bŭt, rụde, fụll, bûrn; *out*; *ü*=French *u*, German *ü*; *ġem*, *ḡo*; *th*in, *th*en; *ṅ*=French nasal (Jea*ṅ*); *zh*=French *j* (*z* in azure); *κ*=German guttural *ch*.

NAGOYA, JAPAN. The fourth largest city of Japan is the ancient castle town of Nagoya. It is on Honshu Island at the head of Ise Bay, about halfway between Tokyo and Osaka. Nagoya began in the 16th century as a village surrounding the Imagawa and Oda family castles. It became important in 1610 when Ieyasu built a strong fortified castle.

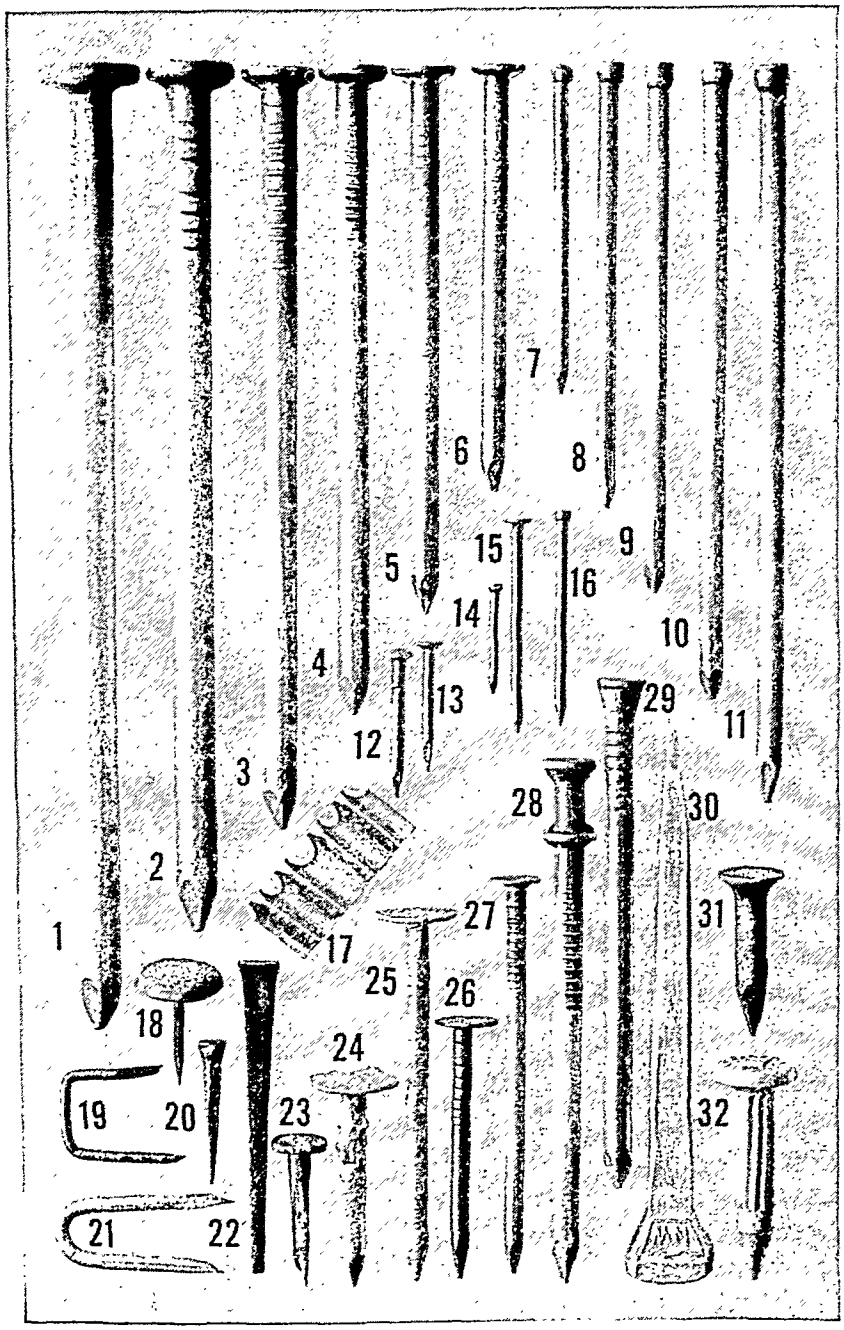
The city grew into a major industrial center. During the second World War, its huge Mitsubishi aircraft factory and other industries became targets for American bombers. Nearly one third of the city was destroyed. Nagoya is famous for pottery, porcelain, and "cloisonné" enamelware and for textiles and dyeing. Other manufactures are machinery, locomotives, lacquer ware, clocks, and toys. The city is an important railway center and port.

Shrines and temples are numerous. Air raids in 1945 destroyed ancient Nagoya Castle and Atsuta Shrine, one of the most sacred in Japan. Osu Kannon Temple is dedicated to the Goddess of Mercy. Nittaiji Temple has a relic of Buddha. Population (1950 census), 1,030,635.

NAILS. A modern nail-making machine produces a nail in a split second. At one end, steel wire is reeled into it at a tremendous rate. Powerful shears cut the wire into the required length, pliers fashion the point, and a hammer strikes a terrific blow on the other end to form the head. Out of the machine pours a stream of bright nails—a thousand a minute—with a roar like a machine gun or a pneumatic riveter.

In colonial days, every nail was hammered out by hand on an anvil. Many country folk of New England had forges in their chimney corners, and on winter days and in evenings when little work could be done,

VERSATILE SERVANTS OF CONSTRUCTION



All nails shown in the picture at the left are actual size.

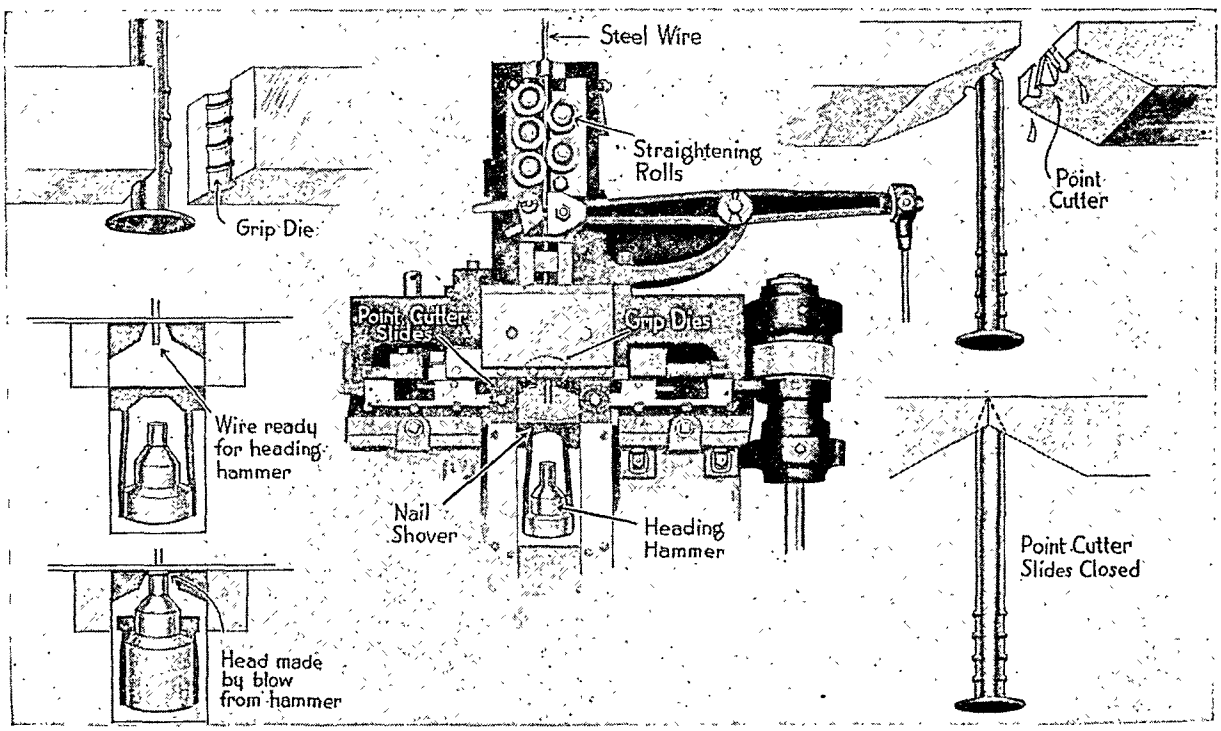
1-6. Common wire nails, for general construction. Sizes: 30d (thirty-penny), 20d, 16d, 10d, 8d, and 6d.
7-11. Finishing nails, small-headed for cabinetwork, door frames, and moldings. Sizes: 4d, 6d, 8d, 10d, and 16d.
12. Brass-plated escutcheon pin, for upholstery and other decorative work.
13. Cigar-box nail, with large head.
14. One-half-inch brad, for wood trim.
15. One-inch wire nail, for small boxes.
16. One-inch brad, for wood trim.
17. Corrugated steel fastener, for holding frames together at their seams.
18. Upholstery nail, with decorative head.
19. Blued double-pointed tack.
20. Shoe nail.
21. Galvanized flat-point staple.
22. Cut nail, has good holding power.
23. Blued carpet tack, usually sterilized.
24, 25. Short and long roofing nails, with rustproof zinc coating.
26. Wallboard nail.
27. Crating, or box, nail.
28. Dual-head anchor nail, used to build forms. It is driven in only to the collar. In dismantling the form, it can be pulled without damaging the wood.
29. Flooring nail, with tapered head.
30. Horseshoe nail.
31. Concrete nail, of hardened steel, driven into concrete walls.
32. Masonry nail, of cadmium-coated hard steel, driven into brick walls.

quantities of nails were made, even by the older children. The nails were forged from "nail rods" heated on the small hearth, and hammered and cut into the proper length. The heads were formed by dropping the spike into a hole in a piece of steel just deep enough to leave a small portion projecting to be hammered flat. No wonder nails were scarce and expensive in those hand-manufacturing days.

But now all we have to do is to insert the end of our coil of wire into the machine, turn on the power, out the cut nail, although the latter holds better and is more durable. About 13 times as many wire nails are now produced as cut nails. Common screws for cabinet and carpenter work—which are really only a form of nail—are made by automatic machines much like those that make nails.

Nails for shoeing horses are still for the most part hand forged from fine grades of wrought iron. They must be tough and of the same composition throughout, so they will not break off in the horse's hoof.

MAKING NAILS—A THOUSAND A MINUTE



This group of pictures shows you how wires are made into nails. After entering the machine and passing through the straightening rolls, the wire is caught by the grip die, which puts on the studs. Then the cutter closes upon the wire and cuts the point, while the heading hammer comes up against the lower end and flattens out the head. As soon as made, the nails are knocked off from the parent wire by the "nail shover," and fall into a basket at the rate of one thousand a minute.

and from time to time place a new keg to catch the nails as they stream out at the rate of from a hundred to a thousand a minute, depending on the size. Without this wonderful machine it would be impossible to furnish the nails needed in modern buildings. In the United States so many wire nails (to say nothing of other kinds) are used that if all those made in a year were cast into a single nail, that gigantic nail would be higher than the Eiffel tower.

The first man to invent a nail-making machine was Ezekiel Reed, a Massachusetts man who took out a patent in 1786. His machine in an improved form is still used for making cut nails. Strips of metal the thickness of the nail are fed into the machine, and a "slicer" cuts them into square-sided nail lengths, which are firmly clutched at the neck until the upper end is hammered into a head. These cut nails taper, but are not pointed.

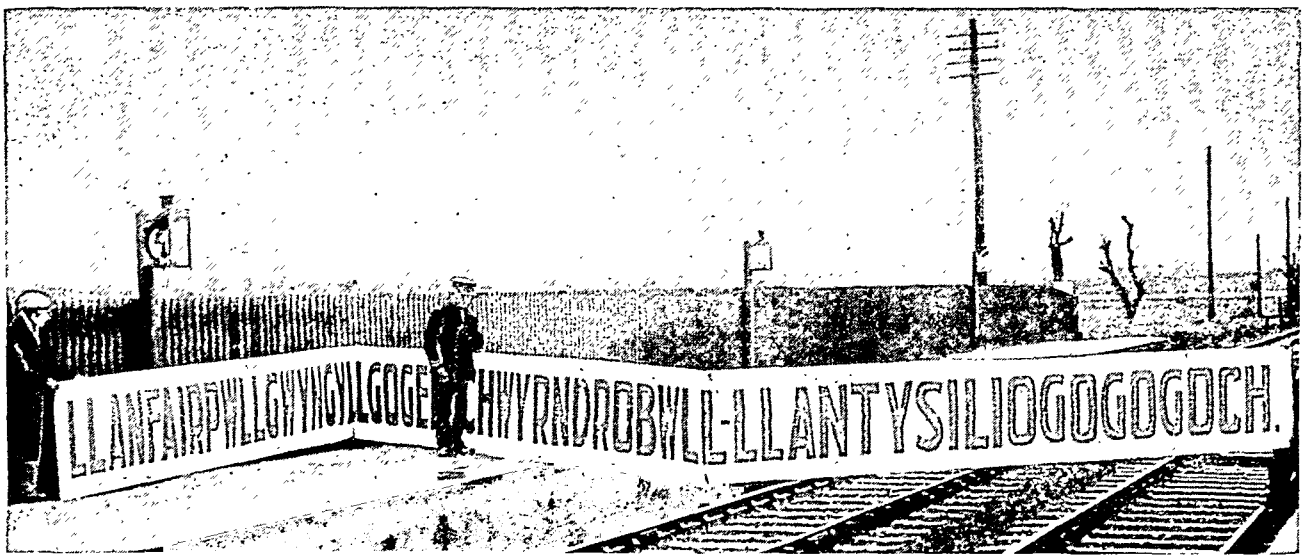
About a century after the invention of this machine, the wire nail came into general use. almost driving

More than 1,100 types and sizes of nails are manufactured. Wire and cut nails are made of various metals—iron, brass, copper, aluminum, zinc, etc. They are produced in a great variety of forms, according to the purpose for which they are intended. There are, for example, shingle nails, finishing nails, barbed box nails, flooring nails, boat nails, trunk nails, and picture nails. They are usually sold by weight, the price increasing with the smaller nail sizes.

Nails are distinguished in size as *twopenny* (abbreviated 2d, meaning 1 inch in length), *threepenny* (3d, $1\frac{1}{4}$ inches), *fourpenny* (4d, $1\frac{1}{2}$ inches), and so on up to the *60-penny* (60d, 6 inches) size. Nails are classified by the "penny" because they were once sold by the penny in England. Thus a 10d nail sold for ten pence per 100 nails. The English abbreviation "d" means "penny." Today "d" refers only to the length of the nail.

New England is the section producing the most nails in the United States today.

"WHAT IS *the* NAME, *Please?*"



Welshmen on the Island of Anglesey in Wales Are Proud of the 57-Letter Name of Their Tiny Village

NAMES. A story is back of every name—whether it be a personal name, a place name, or the name of just a thing or an idea. Names of things, for example, may come from their use, such as "raincoat." Or the name of an object may come from a distinguishing characteristic, such as the name "rifle," which means a gun with grooves cut into the barrel. The name comes from an Old French word *rifler*, meaning "to file or scrape." Still another kind of object name is the name of origin, such as "petroleum," from the Latin words *petra* (rock) and *oleum* (oil)—rock oil.

Many things are named for people, as "macadam," the paving material named for its inventor, John L. MacAdam, a Scottish engineer. One of many ideas named after a person is "boycott," meaning refusal to deal in certain goods or with certain groups of people. The name originated about 1880 from Charles C. Boycott, a land manager in Ireland (*see* Boycott).

The Strange Story of Our Own Names

In very early times, each person had only one name. This was his *given* name, which he might receive at the time of his birth or later. The Bible tells us that when the prophetess Hannah, in answer to her prayer, gave birth to a son, she named him Samuel, meaning "God hath heard." Among other Biblical names, Isaac means "laughter"; Isaiah, "salvation of Jehovah"; Solomon, "prince of peace."

In savage societies, given names changed frequently, just as nicknames arise today (*see* Nicknames). An Indian brave who was called at birth "Morning Cloud" might later in life be known as "Deer Slayer" in honor of his hunting skill.

The World Grows—and So Do Our Names

When men lived in small tribal groups, this single given name was enough. As civilized communities grew, however, there would be many by the same name, and so people began to add some qualification. At first, this was usually the name of the father. In the New Testament, for example, we find "James, the son of Zebedee." Another qualification was the name of a person's birthplace, as "Paul of Tarsus." These qualifications enabled people to distinguish one James and one Paul from another.

Among the Romans this practice developed into the use of real family names, or *surnames*. Each descendant bore, in addition to his given name, the distinguishing name of his ancestors.

How Family Names Arose in Western Europe

With the fall of the Roman Empire the use of surnames virtually ceased. They did not appear to any large extent until the late Middle Ages and did not develop in England until after the Norman Conquest in 1066. They started to become general only during the Renaissance. In 1563 the Council of Trent speeded the adoption of surnames by establishing baptismal registers, which required the surname as well as the given name—also called *baptismal* or *Christian* name.

Our family names have come down to us in several ways. In England, a common way grew out of a man's occupation. There were so many Johns, for example, with nothing to tell them apart, that people began to refer to one as John the *smith;* another, John the *miller*; or John the *baker*. Gradually these distinguishing names became fixed as family names, or surnames.

Other surnames that come from occupations include Carpenter, Taylor, Wright, Turner, Clark (clerk), Cook, Carter, and Gardiner. The reason there are so many surnames of Smith today is that during the Middle Ages the name was used for all metalworkers, or *smiters*, which means "to beat." These include blacksmiths, who worked in iron; whitesmiths, who worked in tin; locksmiths, and so on.

Another common way of forming surnames came from the given, or Christian, name of the father. Such names are called *patronymics*, meaning "father-names." Johnson is "John's son." Jones and Jennings are modified forms of the same name. Williams, Williamson, and Wilson all mean "the son of William."

In Spain, the men of many cultured families also use the *matronymic,* "mother name." The man's surname begins with the patronymic which is then joined by the Spanish word "y" (meaning "and") to the matronymic. An example is the name of a famed Spanish philosopher, José *Ortega y Gasset.*

Names from Animals, Places, and Appearances

Many of our surnames come from animals, largely because people in the Middle Ages used signs instead of numbers to distinguish shops and inns. A man might become known as Lyon (lion) either because of his courage or because his shop sign carried the figure of a lion. Other familiar examples are Bull, Hart, Peacock, Fox, Badger, Lamb, and Stagg.

Other names are derived from where a man lived or from where he came. Regions furnished such names as Scott, English, Irish, Ireland, and French. Topographic terms contributed Hill, Ford, Forest, Field, Lake, and Rivers. Some came from buildings, as Hall, House, Church, and Temple. From the directions came North, Southey, West, and Eastman; and from the seasons, Winter and Summers.

Still other names came from a man's appearance, as Long, Short, Little, and Longfellow. The name Brown was probably given to a man because of his complexion or perhaps because of the color of his clothes. Others that, perhaps, were nicknames first are Drinkwater, Doolittle, Lovejoy, Makepeace, and Shakespeare—which really means "shake a spear." Some names come from familiar objects, as Foot, Moon, Starr, and Pepper.

Biblical characters and saints have furnished many surnames. From Elijah come Ellis and Elliot; from Matthew, Matthews and Mayo; from Andrew, Andrews and Anderson. Names of saints are common, as Martin, Gregory, Lawrence, Nicholas and Nichols, Vincent, and Austin (from Augustine). Mitchell is derived from Michael, the archangel; Phelps, from Philip.

Surnames in Other Languages

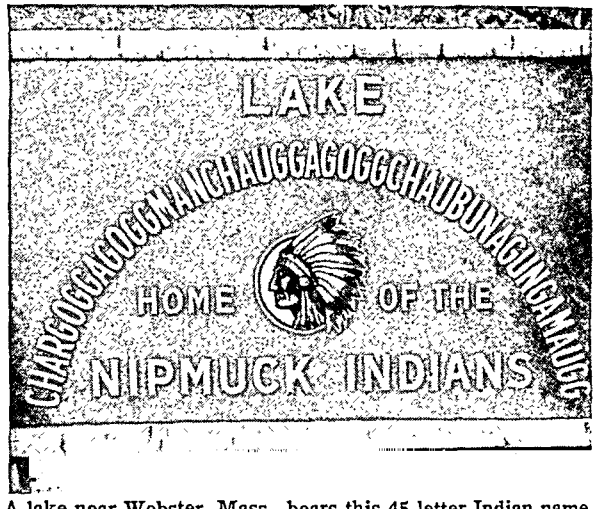
In most languages surnames are formed in much the same way as in English. Corresponding to the English suffix *-son* to denote "son of," the Scottish language uses the prefix *Mac,* as in Macdonald. In Irish names the prefix is *O',* as in O'Brien; the Norman-French is *Fitz,* as in Fitzgerald; and the Welsh *Ap,* Apowen, which is now simply Bowen.

The Russian suffix *-ovitch* also means *son.* The Russian name Ivanovitch, son of Ivan (John), corresponds to the English Johnson. The Swedish suffix is *son;* Danish and Norwegian, *sen.* In Polish the suffix for son is *owski;* in modern Greek, *opolos.*

Jewish Surnames Latest to Arise

As the Jewish people in Europe usually lived in compact, secluded communities they did not need the identification of surnames. As they grew in number, however, various nations made laws compelling the Jews to adopt surnames. Austria led the way in 1784; France in 1803; and Prussia in 1812. Some Jewish families took theirs from personal names, as Jacobs, Levy, and Moses. Others formed their surnames from place names, as Hamburg, Frankfurter, and Speyer.

AMERICA RIVALS WALES



A lake near Webster, Mass., bears this 45-letter Indian name. Historians say several tribes fished here, and the name means "Fishing Place at the Boundaries—Neutral Meeting Grounds."

The noted Rothschild family took its name from the red shield (*rothen Schild*) used as a sign over their shop in Frankfurt (*see* Rothschild Family).

Many Jewish families took poetical or colorful names such as Rosenberg (rose mountain), Gluckstein (luck stone), Rubenstein (ruby), and Goldenkranz (golden wreath). Animal names were also popular, as Adler (eagle), Hirsch (hart), and Lowe (lion).

Middle and Hyphenated Names; Change of Name

A "middle" name, or the initial used for it, helps further to identify a particular person. The custom is relatively recent. The first president of the United States to use a middle name, for example, was John Quincy Adams, named for his birthplace, Quincy, Mass. Most Americans simply use the initial of their middle name, as John Q. Adams.

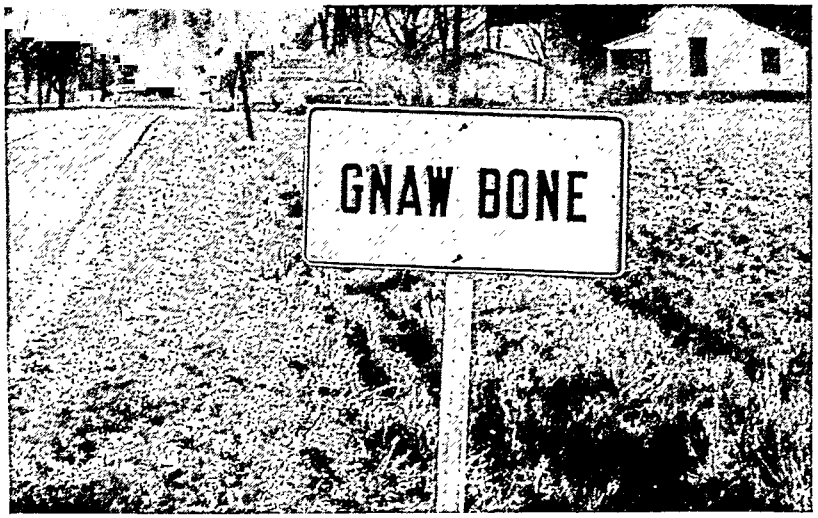
Hyphenated names, as James *Foster-Lynch,* usually perpetuate the surname (Foster) of some earlier branch of the family. They are more common in Europe than in the United States.

OUR 25 LEADING NAMES

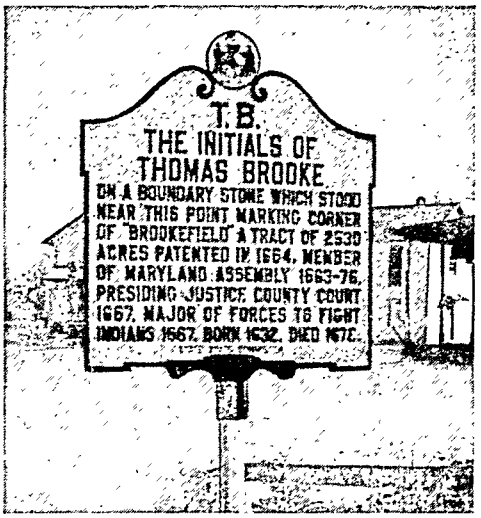
Name	Est. No.	Name	Est. No.
Smith	1,345,600	Thompson	349,800
Johnson	976,400	White	346,300
Brown	896,800	Jackson	339,600
Williams	764,200	Harris	317,400
Jones	727,800	Clark	306,900
Miller	645,100	Lewis	298,300
Davis	582,200	Hall	273,800
Wilson	437,400	Allen	249,400
Anderson	432,200	Young	249,100
Thomas	377,900	Robinson	247,000
Moore	377,700	Walker	245,100
Taylor	369,300	Nelson	225,900
Martin	355,000		

And Smith still leads all the rest! These are the 25 most common surnames in the United States as estimated by the Social Security Administration from its national file of cardholders.

HUMOR AND HISTORY IN AMERICAN PLACE NAMES



Gnaw Bone, Ind., has a population of two. Legend says a settler asked the whereabouts of a neighbor and was told: "I seed him a-settin' on a log above the sawmill a-gnawin' on a bone."



One of our shortest place names is T. B., Md. (population, 100), the initials of a colonial landowner. In Europe, Norway boasts of an even shorter place name, the village of Å.

In Britain, members of the peerage use only surnames as signatures. Members of royalty, however, sign only their given names. The reigning monarch adds the accession number, as Elizabeth II; on state papers the signature is Elizabeth II Regina (queen).

In both Britain and the United States a person may change to any surname he wants. Usually he or she applies to a court of law for the change and then publishes it officially. He can, however, change it simply through the use of common law.

After marriage, almost every woman uses the surname of her husband, though a few feminists go by their maiden names, as do some artists and professional women. People in the theater and in the arts often assume a "stage name" which they think more attractive or attention-getting than their own. To hide their identity, some writers adopt a pseudonym, Greek for "false name."

Styles in Given Names

Styles change somewhat in given names just as they do in clothes. In the 17th century, for example, some of the more learned people gave their children names that were pure Latin or closely related, such as Primus for the first-born. Among the children born on the *Mayflower* was Oceanus Hopkins, born on the ocean. Another was Peregrine White, born in Plymouth harbor—from the Latin *peregrinatro,* "alien."

Most given names in Europe and in the United States, have come down through the Christian church, for example, John and Mary. Even such ancient Greek names as George and Dorothy and Roman names such as Martin and Anthony were preserved as names of saints and church leaders.

Many families continue given names from one generation to another. When a son is given the exact name of his father, the son becomes a Junior, as Edward Scott Ross, Jr. When he, in turn, so names his son, the son's name is Edward Scott Ross III.

The popularity of certain names varies. The name Deborah ("a bee") was a favorite in the 18th and 19th centuries, then it fell into disuse because it was considered "old-fashioned." In the 1950's, however, it again became popular. The renewed popularity of a name often arises from its use by a prominent current figure, such as a national hero, a motion-picture star, or a political leader. Unfortunately, naming a child for such a person of a particular era tends to "date" the child in later years.

In the South, double given names are very popular, as Mary Lou for girls and Billy Joe for boys. Throughout the country there has been a trend to give girls names which depart from obviously feminine names, such as Lauren, Dale, and Paige. For years, in the United States, the names Dennis, Michael, and Sheila were almost entirely limited to people of Irish ancestry; then, in the 1950's, they were widely given to children of other ancestry.

Place Names and Trade Names

In contrast to the relatively simple development of personal names, the origin of *place* names is often a mystery. For every obvious place name such as France, named after the Teutonic tribe of Franks, there are hundreds which scholars are still trying to trace to their roots. Even the meaning of the name Chicago, for instance, is disputed—"place of the skunk," or "place of the wild onion," or just the Indian word for "great" or "powerful."

The United States has some of the most poetic, simple, extravagant, and amusing place names in the world. Many of them, such as New York, are merely adaptations of names in the Old World. Others, such as Pennsylvania (Penn's Woods), were coined. Many, such as Denver, honored the surname of a pioneer. Some are topographic, as Elk Run. Others expressed longing and determination, as New Hope. Some commemorate Biblical towns, as Berea and Nazareth.

Just as diverse are the *trade* names invented by manufacturers to distinguish their products. Copyrights protect such names, but some trade names lose their individuality by common usage.

NANKING, CHINA. More than two thousand years ago Nanking was founded, and in succeeding centuries it has more than once alternated between glory and tragedy. Its name means "southern capital." It is located in the province of Kiangsu, on the south bank of the Yangtze River about 200 miles west of Shanghai.

Nanking's greatness began in 1368 under the first Ming emperor. He saw the long undulating line of hills rising from the bank of the Yangtze like the sacred dragon's body, and decided that on the dragon's back he would establish his capital. A wall 28 miles long, 60 feet high, and about 30 feet thick was built around it. Nearly 500 years later during the Taiping Rebellion much of the city was destroyed.

In the 20th century Nanking took on new life, for it was here in 1912 that China was proclaimed a republic. In 1928 Nanking became the capital of the Nationalist government. High on near-by Purple Mountain was built the tomb of Sun Yat-sen, first president of the republic. The rebuilt city became a trade center of the populous Yangtze Valley, and its factories produced silk goods, paper, porcelain, brassware, tapestries, and a cotton cloth named "Nankeen." The population grew to about 1,000,000.

But in 1937, when Japan invaded China, Nanking again was all but destroyed. Japanese troops massacred thousands of its people. The city became the capital of Wang Ching-wei's puppet régime. In 1945, after the second World War, Nanking again became the capital of Nationalist China. But the Communists seized it in 1949, and it reverted to a sprawling provincial city. The Communists took over the famous Nanking University. Population (1947 est.), 1,084,995.

NANTES (*nänt*), FRANCE. Dating from the Celtic Namnetes who ruled here before the Romans, this city is best known for the Edict of Nantes by which Henry IV in 1598 granted toleration and civil rights to the Huguenots or French Protestants (*see* Henry, Kings of France). Although it is 50 miles from the sea, it is an important port of France. Its position on the Loire River, which has been improved as a waterway, makes it a center for commercial waterborne traffic. The leading industries are shipbuilding and the manufacture of sugar, oil, textiles, machinery, food products and iron products. Nantes contains a number of historic public buildings, among them a beautiful cathedral and a medieval castle. Historically, it is one of the chief cities of Brittany. During the first World War several American hospitals were established here. Population (1946 census), 187,259.

NAPLES, ITALY. To catch the spirit of Naples the visitor must see it first as he sails between the islands of Ischia and Capri, and enters the celebrated Bay of Naples, some 22 miles wide. There at the northern apex of the bay lies the noisiest, most picturesque, and most fascinating of Italy's historic cities. As the ship plows forward, through the bluest of waters under the bluest of skies, the sloping city appears, flanked seven miles to the east by the ominous bulk of Mount Vesuvius, and on the west by the graceful heights of Posilipo. In the background an amphitheater of volcanic hills curls around the city, which has been called the most beautifully situated in all Europe. To the lovely island of Capri go 30,000 tourists every year to enjoy the balmy air and the picturesque scenery and to view the ruins of the palaces in which the profligate emperor Tiberius spent the last seven years of his life.

From a crest north of the city, where stands the massive bulk of St. Elmo Castle, built in the 16th century and now used as a prison, a spiny ridge runs down to the sea, splitting the city in two. This ridge ends in a rocky islet, on which stands the Castello dell' Ovo—so called because it is egg-shaped—built in the 12th century.

In the older and larger part of the city, to the east of this ridge, the spires of scores of ancient churches rise, intermingled with large public buildings, and here and there a factory chimney. In this quarter the poorer people live, and here centers the industrial and political life of the city. On the western side of the ridge are the new fashionable dwellings of the rich, built on terraced hills and commanding sweeping views of the bay, with the twin mountains of famous Capri in the far distance.

How Naples Suffered from Growing Too Fast

Naples is said to be the most densely populated European city. During the last century its population increased at a rate far more rapid than did its dwelling places, and for many decades the poorer people were crowded together so thickly that disease, crime, and vice flourished hopelessly in filthy tenements. In 1884 a fierce epidemic of cholera broke out which carried away thousands of victims. Shortly afterward the center of the old district was literally torn out by the roots. Modern buildings and broad streets were built, an excellent water supply was piped in, and conditions improved at once. Even today the thriving business carried on by its factories, and the immense exports and imports which pass through its magnificent harbor, continue to draw people to Naples. Dwellings are crowding out the beautiful gardens and groves, while the expansion on the outskirts bids fair soon to connect the pretty chain of small suburbs on the shores of the bay into one huge city.

Naples is a center for the manufacture of silks, cottons, and woolens, glass, coral, tortoise shell, and other art objects, kid gloves, tobacco, olive oil, soaps, perfumes, chemicals, and macaroni. Machinery, guns, and other objects of steel and iron are growing in importance; and wine is an important export. But a carefree spirit seems to mark the city's industrial life. The workers from the factories, the peddlers pushing their carts in the markets with shrill cries, the mule drivers from the surrounding country bringing in their produce, the fishermen from the near-by villages—all mingle together in the streets in a gay and noisy throng, shouting, waving arms, singing and laughing—all this presents a scene not matched anywhere in the world.

The instinctive love of beauty which is characteristic of the Neapolitans is reflected in their appreciation for serious art. Naples is filled with museums, theaters, and opera houses, among which is San Carlo, one of the largest opera houses in Europe, where many of the best singers in the world may be heard.

Rich Cultural Heritage

Many remains of classical days add to the city's historical interest. The cathedral, one of the principal edifices, dates back to 1272, and stands on the spot where were formerly two temples dedicated to Neptune and Apollo. Naples was one of the earliest centers of learning in Europe. The University of Naples was opened in 1224 by Frederick II, Holy Roman emperor, to draw students away from the University of Bologna. The National Museum of Naples is one of the most important in the world. In it are housed objects dug up at Pompeii and Herculaneum and unequaled Greek and Roman relics, as well as collections belonging to the Italian crown, the Farnese group of paintings and sculpture, and 600,000 books, pamphlets, and manuscripts containing many rare historical writings. A big Marine Aquarium contains the largest collection of living sea animals in the world and its laboratories attract zoölogists from all parts of the globe.

THE BEAUTIFUL AND HISTORIC CITY OF NAPLES



When the Neapolitan, boasting of the beauty of his town, says, "See Naples and then die," he thinks perhaps chiefly of its spacious and lovely bay, curved like a half-moon, and rimmed with headlands. The city itself cannot vie with Rome and the towns of northern Italy in palaces and monuments; but its picturesque streets teem with life and gaiety. Naples is known as "the mother of modern opera."

Naples was an old Greek settlement (called *Neapolis*, "the New City"), founded about 450 B.C., when southern Italy and Sicily were styled *Magna Graecia* ("Greater Greece"). The Romans conquered it in 326 B.C., but the Greek language and customs survived down into the days of the Roman Empire. It suffered in the 6th century when the generals of the eastern Emperor Justinian wrested it from the East-Gothic conquerors of Italy. The Normans conquered it about 1130, and it became the capital of the "Kingdom of the Two Sicilies," which these mighty descendants of the Northmen set up in southern Italy. It flourished greatly under the enlightened Frederick II, of the Hohenstaufen house, whose mother was the last of the Norman line. He it was who founded its university, and in this court, where mingled Greek, Saracen, Teutonic, and classical elements, the first stirrings of the Renaissance were manifest. With the pope's aid the descendants of Frederick II were finally overthrown and Charles of Anjou was seated on the throne (1266).

For centuries this territory was then the scene of violent intrigue and war. From 1266 until 1494 it was fought over by Angevin and Aragon princes; then the kings of France and Spain alternately took possession, until the latter gained the ascendency in 1504, ruling the Two Sicilies until 1713. After the War of the Spanish Succession (1701–13) the Two Sicilies passed to the Austrian Hapsburgs, who surrendered it to a branch of the French house of Bourbon in 1743. While Napoleon Bonaparte was making Europe over, his brother Joseph sat for a time on the throne, and then Joachim Murat, Napoleon's brother-in-law occupied it for a while. After Napoleon's fall Naples returned to the Bourbon government until it was liberated by Garibaldi and became a part of United Italy in 1861 (*see* Garibaldi; Italy).

Naples—with 1,003,815 people (1951 census, preliminary)—was one of Italy's chief industrial centers and ports. It was bombed and shelled repeatedly by the Allies during the second World War in an effort to destroy its factories and cripple its port facilities. When the Allies captured Naples in 1943 they found that the retreating Germans had demolished the harbor and had destroyed many of the factories and public buildings, including the Royal Society's library and much of the University of Naples. Typhus struck the rubble-littered city, but the Allies stamped out the disease before it became epidemic. Allied engineers reconstructed the harbor for military shipping. By 1946 Naples had erased most of its war scars.

The CORSICAN *Who* CONQUERED *Half of Europe*



This picture shows one of the most remarkable incidents in the career of Napoleon. It happened after he had escaped from Elba with a handful of soldiers and set out for Paris. As he approached the city of Grenoble, a general of the royal forces in command of 6,000 men was sent out to take him prisoner. On meeting them Napoleon dismounted and advanced alone. The order to "Fire" had already been given. But Napoleon, baring his breast, said: "Where is the man who would shoot his emperor?" At his words the soldiers who had been sent to stop him threw down their guns and hailed him as their leader.

NAPOLEON (*nà-pō'lē-ŏn*) I, EMPEROR OF THE FRENCH (1769–1821). Not a drop of French blood flowed through the veins of Napoleon Bonaparte, who for 16 years was the absolute master of France. He was barely a Frenchman by birth, for the island of Corsica, in which was located his native town of Ajaccio, was handed over to France by Genoa in 1768, only a year before Napoleon was born.

His family, which had been established in Corsica since the 16th century, had come from the mainland of Italy, probably from Tuscany. His father, Charles Buonaparte, was a lawyer in moderate circumstances; his mother, Laetitia Ramolino, was a beautiful woman of strong character. Napoleone Buonaparte—such was the Italian name he received when christened—was the second son in a large family (*see* Bonaparte). For some years after the French occupation his father sided with the Corsican rebels; and as a youth Napoleon hated the French, whom he regarded as oppressors of his native land.

He carried this feeling with him to the government military school at Brienne, in northeastern France, to which his father sent him at the age of nine. The five years he spent here were not happy ones; and he frequently engaged in fights with the French students, who thought him a gloomy sullen lad. The next two years (1784–85) the boy spent at the École Militaire in Paris, where he received excellent training as an artillery man and an officer. Then his father died, leaving Napoleon—although he was not the oldest son—with the responsibility of providing for the large family.

At the age of 16 the youth began his service in the French army as second lieutenant of artillery. His proud nature, his poverty, and his foreign birth still cut him off from his fellows. His thoughts were still all on Corsica, and he absented himself from the army for long periods to engage in plots at home. His schemes were not successful, however; and in 1792 he was forced to flee with his family and take refuge in France. His love for Corsica was thenceforth dead; it meant no more to him than did Malta or Corfu. There came a time when he declared, "Among all the insults hurled against me, that of 'Corsican' is the most mortifying."

Meanwhile the young officer had witnessed in Paris some of the stirring events of the French Revolution, which had broken out in 1789. Most of the French officers had remained faithful to the king. But Bonaparte, who had no share in their traditions of loyalty, viewed the Revolution with an open mind. The Republic had to face both foreign and civil war, and

was badly in need of able officers. It soon found a use for the little Corsican with the pale face and unkempt hair. In 1792 Bonaparte was made a captain; and in 1793 he was chosen to direct the artillery in the siege of Toulon, a French port whose people had rebelled against the Republic. Here Bonaparte first gave evidence of his extraordinary energy and ability. "If you are ungrateful toward him," wrote his commanding officer, "this man will contrive his own advancement."

On the fall of Toulon, Bonaparte was given command of the artillery of the army of Italy; but he had little opportunity to distinguish himself in this campaign. Indeed, for a time fate seemed against him. The Jacobins, with whom he had established friendly relations, fell from power; and in 1795 Bonaparte was back in Paris, deprived of his command, without money or friends, and suspected because of his Jacobin connections. Now 26 years old, he was still unknown to the world that was to ring with his name.

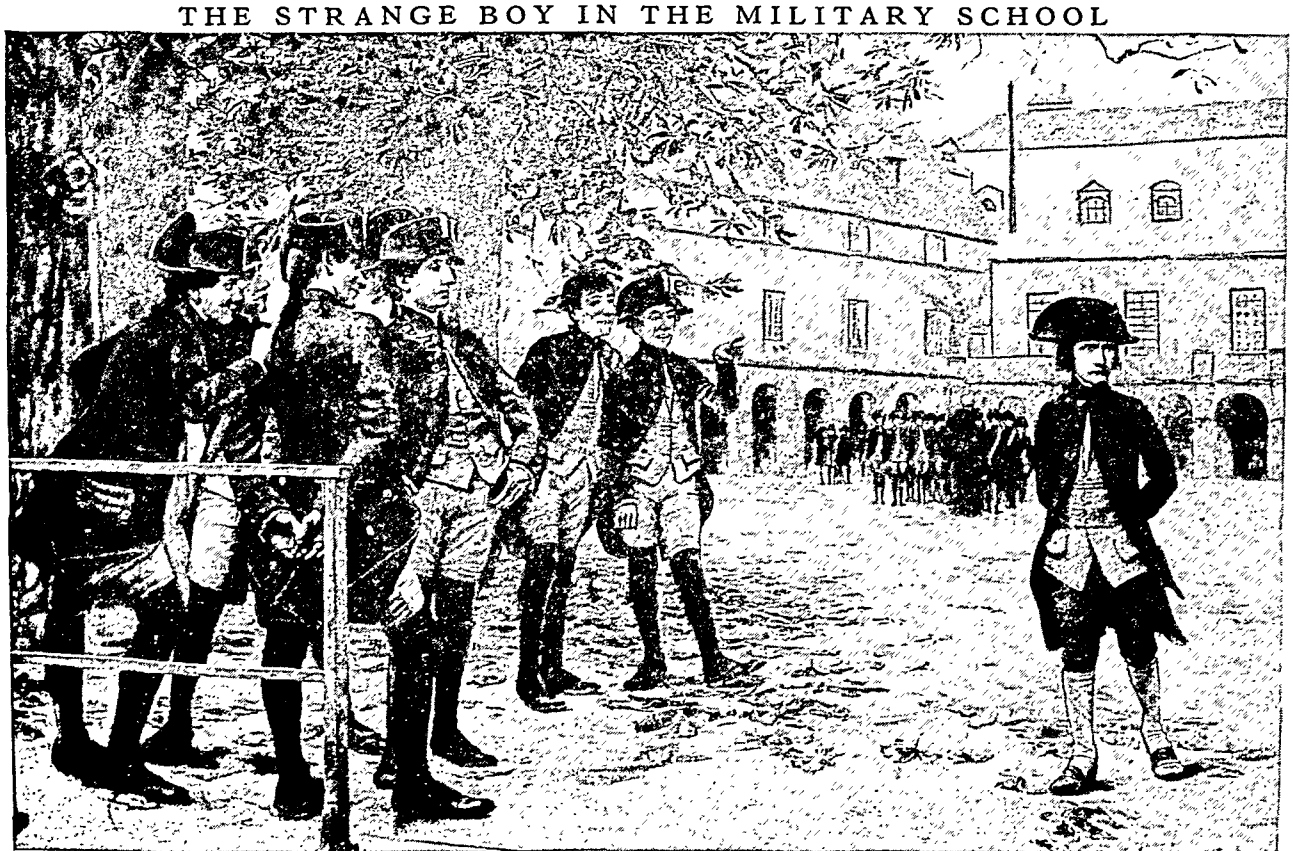
Then in October 1795, his great opportunity came. The people of Paris, tired of war and privations, rose against the Convention (the legislative body). Bonaparte was appointed to put down the royalist insurrection. He took complete control, issued rapid orders, and with what Carlyle called "a whiff of grapeshot," shot down the rebels in the street, and saved the Convention. The government showed its appreciation by appointing him commander in charge of the army in Italy, which was operating against the Austrians and their allies. And as his second reward he won the hand of Josephine, the beautiful widow of the Viscount Beauharnais, who had been guillotined during the Terror. He married her in March 1796; and in that same month took over his new command.

Brilliant Campaign in Italy

Of all Bonaparte's campaigns none is more interesting than this first one in Italy in 1796–97. Even older and more experienced generals serving under him yielded to his indomitable will, his flashing eye, and his brilliant plans. His men were thrilled by the burning words of his first proclamation: "Soldiers, you are ill-fed and almost naked. The government owes you much, but can do nothing for you. Your patience and courage do you honor, but procure you neither glory nor profit. I am about to lead you into the most fertile plains of the world. There you will find great cities and rich provinces. There you will win honor, glory, and riches. Soldiers of the Army of Italy, will you lack courage?"

The campaign showed General Bonaparte's great military genius, and stirred to life his great ambition. His quick mind seized every geographical detail which might help or hinder his operations. He was prompt to guess the plans of his enemies, whom he bewildered by his rapid movements. His favorite

THE STRANGE BOY IN THE MILITARY SCHOOL



"The mighty tread of the Emperor's footsteps on the Continent soon drowned the echoes of the cannon of Trafalgar," wrote the French historian Thiers, speaking of this moody and solitary boy who is here pacing the grounds of the military school at Brienne, to the amusement of his fellow students. At that time the great Napoleon was only a friendless alien who spoke French with an Italian accent, while his fellow students were sons of the aristocracy of France. Their taunts made his life miserable, and he grew to a morose and pessimistic young manhood.

device was to cut the enemy's army in two, and then throw his whole force against one of the enemy fragments before they had a chance to reunite. By this method in 1796 he defeated the Sardinian troops five times in eleven days, threatened their capital (Turin), and forced the king of Sardinia to sue for peace to an army "with neither artillery, cavalry, nor shoes to its feet."

Then Bonaparte turned eastward against the Austrians. His bravery was shown when in the face of a withering fire he forced his way across the bridge at Lodi—an exploit that won from his troops the affectionate name of the "Little Corporal." He then besieged a part of the Austrian forces in Mantua. Four times the Austrians sent armies across the Alps to relieve that fortress, but each time Bonaparte defeated them, and finally the fortress fell in February 1797. He then carried the war into Austria itself, and had advanced to within 80 miles of Vienna when the enemy offered to make peace. According to Bonaparte's proclamation, he had been victorious in 14 pitched battles and 70 combats. His army had conquered rich lands which fed and paid the army during the campaign, and sent millions of francs to relieve the financial distress of the home government. By the treaty of Campo Formio, which Bonaparte negotiated with Austria, Austria ceded to France the Austrian Netherlands (Belgium) and Lombardy, which became the French Cisalpine Republic. Austria also recognized the Rhine as the eastern boundary of France. In return France gave Austria most of the territories of the old Venetian Republic.

Expedition to Egypt

When the conqueror of Italy returned to Paris he was given a triumphal reception such as had been given to no other general of the Revolution. Thirst for political power had now replaced his youthful ambition for Corsica. "Do you suppose," he is reported to have said, "that I have gained my victories in Italy in order to advance the lawyers of the Directory?" But the "pear was not yet ripe for picking," he felt, and so, because he was afraid that the people might tire of him if they saw him too much, he planned new conquests. He finally persuaded the willing Directory to send him to Egypt. There on the banks of the Nile he expected to imitate the exploits of Alexander the Great, and at the same time to strike a blow at France's most powerful enemy, England, by opening a route to India. But here he was doomed to disappointment. The battle of the Pyramids, fought near Cairo (July 1798), put Egypt at his mercy; but his fleet was destroyed by the British in the battle of the Nile at Aboukir Bay (*see* Nelson, Horatio), and he was cut off from reinforcements. At Acre, in Syria, British troops fighting alongside those of Turkey held out and Bonaparte had to return to Egypt. At last disquieting news summoned him home.

There he found the Directory discredited because of its disastrous wars in his absence. Bonaparte joined accordingly in a plot which in November 1799 overthrew the Directory and set up in its place a government called the Consulate, with Bonaparte as the first of the three consuls. Three years later he became First Consul for life with the right of appointing his successor. Thenceforth he styled himself "Napoleon I" instead of "General Bonaparte."

Master of France

The pear was now ripe and had been picked. Napoleon had grasped political power and become master of France. His old ambition was realized, but new ones were forming. He had failed to build up a great eastern empire like that of Alexander the Great. He now aspired to restore the western one of Charlemagne.

By the hard-fought battle of Marengo (1800) he defeated the Austrians. The German states and even England, worn out by war, were ready to give up the struggle, and by the treaty of Amiens, in 1802, France was at peace with the whole world for the first time since 1792. But even in peace the First Consul continued to carry out his ambitious plans. In the 14 months before the conflict began anew, he became president of the Italian Republic, intervened in Switzerland, annexed Piedmont, Parma, and the island of Elba to France, planned the partition of Turkey, and the foundation of a colonial empire which should include America, Egypt, India, and Australia.

Do you wonder that Great Britain felt compelled to renew the conflict and worked hard to build up the Third Coalition (Great Britain, Russia, Austria, and Sweden) against this arch-disturber of the peace? But still Victory smiled on Napoleon. By his complete defeat of the Austrians and Russians at Austerlitz (Dec. 2, 1805), by his crushing blow to the Prussians at Jena (Oct. 14, 1806), and by the battle of Friedland against the Russians (June 14, 1807)—"the worthy sister of Marengo, Austerlitz, and Jena"—Napoleon brought most of Europe to his feet.

Only one obstacle apparently barred his way to the complete mastery of western Europe; that was Great Britain. In 1805 he had planned to invade that island and reduce it to submission. But the favorable moment never came and after England's navy under Nelson had destroyed the French fleet in the battle of Trafalgar (October 1805), Napoleon had no chance to conquer that enemy in battle, and his economic blockade of Britain proved equally futile.

The Code Napoleon

Napoleon's fame rests not only on his military genius but also on his work as a statesman. He now turned his attention to reorganizing the lands he had conquered and to governing France. He had an insatiable appetite for work and unusual powers of endurance. He mastered the details of business with almost superhuman energy and intelligence. A sound currency was established in France, the Bank of France created, roads and canals improved, agriculture and industry fostered. The machinery for local government was simplified and strengthened by a system of departmental *prefects* and *subprefects*, appointed by his government at Paris. The Catholic church which had been suppressed in the course of the Revolution, was re-established by an agreement with the pope,

THE MARRIAGE OF NAPOLEON AND MARIE LOUISE



We are here witnessing the magnificent wedding of the great French Emperor to Marie Louise of Austria. Although the marriage was contracted for political reasons, following the Emperor's divorce of Josephine, Napoleon really loved this daughter of the Hapsburg emperor. Their only son was called Napoleon II and formally crowned king of Rome, but this was only an empty title after Napoleon was overthrown. After his first overthrow, Marie refused to join him in Elba and during the desperate Hundred Days expressed no interest in him. Nevertheless, Napoleon both excused and forgave her desertion.

known as the Concordat of 1801. Military ambitions were stimulated by the formation of the Legion of Honor, to be composed of soldiers and civilians who had greatly served the state. Most important of all, Napoleon, aided by a committee of learned jurists reshaped and codified the confused laws of France, and gave the country a unified, rational system of civil law—the celebrated Code of Napoleon. "My true glory," he said after his downfall, "is not that I have gained 40 battles. Waterloo will efface the memory of these victories. But that which nothing can efface, which will live forever, is my civil code."

He Becomes "Emperor of the French"

Step by step too Napoleon was building up his own position. In 1804 he secured a popular vote sanctioning a change from the consulate to an empire. As "Emperor of the French" he now had the right to hand down the throne to his descendants. In the hope of having a son to succeed him and also to ally himself with one of the old royal families of Europe, he divorced Josephine and in 1810 married Marie Louise, the 18-year-old daughter of the Austrian emperor. He set himself, also, to the work of reorganizing Europe. The Cisalpine Republic was now changed to a monarchy and he himself was crowned king of Italy with the famous "iron crown" of Lombardy. "Roll up that map of Europe; there will be no need for it for ten years to come," the English minister Pitt had said after the battle of Austerlitz. For almost that period Napoleon changed the map at his will. His stepson Eugene was made viceroy of Italy. Napoleon's brother Louis became king of Holland; and Joseph, king first of Naples and then of Spain. General Murat, who had married Napoleon's sister, succeeded to the vacant Neapolitan throne. The dukes of Bavaria and Württemberg, French dependencies, were given the rank of kings. The shadowy Holy Roman Empire was dissolved in 1806, and many of the petty German states were given to their more powerful neighbors, until the number of German states was reduced from some hundreds to about 50. This was the first step in the consolidation of Germany. At the height of Napoleon's power the French Empire included France to the Rhine, Belgium and Holland, parts of Italy, and Croatia and Dalmatia. Spain, the rest of Italy, the Grand Duchy of Warsaw, and the confederation of the Rhine were dependent on Napoleon, and Denmark and Norway, Prussia, and the Austrian Empire were allied with him. Only Great Britain, Russia, Sweden, and Turkey remained outside his influence.

Napoleon freely used the schools to maintain his power. The political creed for the rising generation was set forth in a catechism to be taught in the schools in these terms: "We owe to our Emperor, Napoleon I, love, respect, obedience, fidelity, military service, and the tribute ordained for the defense of the empire and of his throne." In reply to the question as to what was to be thought of those who were unfaithful in their duties toward the emperor, the

catechism replied: "According to St. Paul they sin against the ordinance of God, and are guilty of everlasting damnation."

His Triumph and His Downfall

The high point in Napoleon's career was reached in the years which followed the peace of Tilsit (1807), which was concluded on board a raft in the Niemen River. The Czar Alexander of Russia not only made peace but was won over to Napoleon's plans. Napoleon and Alexander were to divide Europe between them. In return Alexander was to aid Napoleon in his "Continental system," the object of which was to close Europe to England's commerce and thereby force that "nation of shopkeepers," as he contemptuously called it, to sue for peace. At one time or another every state of continental Europe, except Turkey and Portugal, was forced into this commercial system. But all objected to it, because they needed goods from England; and so all found methods of evading the conqueror's decree.

Napoleon had also aroused another great force, which was to bring about his downfall—the spirit of nationalism. In Spain the patriotic fire against French conquest first blazed forth in 1808. The British sent troops to help in this "Peninsular War" (1808–14), and little by little the French were pushed back beyond the Pyrenees.

The day of downfall was approaching. Austria plucked up courage to renew the struggle, but was crushed by the bloody battle of Wagram (July 1809). Then Napoleon struck at Russia for deserting his Continental system. With a Grand Army of nearly half a million men, drawn from "twenty nations," he plunged boldly into that vast country in June 1812. On and on he marched into the heart of the country, continually harassed by the Cossacks. The retreating Russians finally gave battle at Borodino (September 7); but the result was indecisive. On September 15 Napoleon reached his goal, Moscow, where he expected to find shelter and provisions for his tired troops. But he found the city in flames; and the Russians made no peace. Since it was impossible to winter in the ruined city, on October 19 Napoleon began his retreat across snow-covered plains. This retreat from Moscow, which soon became a disorderly flight, is celebrated in art and story as one of the great disasters of military history. Of the mighty force that had set out, fewer than 20,000 ragged, freezing, and starving men staggered across the Russian frontier in December.

THE RETREAT FROM MOSCOW



Marshal Ney, Napoleon's trusted lieutenant, is here seen standing in the ranks with his soldiers, who are holding the Russian cavalry at bay with muskets and bayonets. The great army which had marched into Russia had melted away, and Napoleon had fled to France. Ney, "the bravest of the brave," kept the famished troops together and was the last to cross the frontier.

Napoleon's great career of conquest was over. The flames of national patriotism burst forth in an uprising of Europe. Austria, Russia, and Prussia all joined with Great Britain in the War of Liberation. Napoleon raised new armies and won a few unimportant victories; but in the three days' battle of Leipzig —called the battle of the Nations—(October 1813) the French were outnumbered, outgeneraled, and out-

fought. Slowly but surely the allies then closed in upon Paris—Russians, Prussians, and Austrians from the east and north, and the British and Spaniards from across the Pyrenees. On March 30, 1814, the allies were masters of the French capital. Napoleon's generals refused to continue the hopeless struggle, and he was forced to abdicate (April 11, 1814). He was allowed to retain the title of emperor, and was promised an annual payment of 2,000,000 francs. But his rule was limited to the few square miles of the island of Elba (between the west coast of Italy and Corsica). In the person of Louis XVIII the Bourbons returned to power.

But it was impossible for Napoleon to remain quietly so near France without trying to regain his lost power. He remained on Elba ten months; and then, in March 1815, slipped quietly away and landed in France, escorted by 1,000 of his old guard. As if by magic soldiers rallied to his side, and he made a triumphal march on Paris. Louis was driven from the throne; and for a brief "Hundred Days" Napoleon enjoyed a return of his former glory. But the allies again united their forces against him, and June 18, 1815, on the field of Waterloo he suffered an irretrievable defeat (*see* Waterloo, Battle of).

FALLEN EMPEROR ON HIS "ROCK"



The man who had been master of Europe, who had made and unmade kings and emperors, spent his last days on a lonely island—St. Helena, 700 miles from the nearest land. Once the overlord of an entire continent, he came to be a prisoner who could not even call his own the barren bit of land to which he was exiled. "My rock!" he used to say with grim humor, in speaking of the island, yet he could not even take a walk without a British soldier at his heels.

To avoid falling into the hands of Blücher, who had sworn to shoot him as an outlaw, Napoleon sought refuge on board a British man-of-war and surrendered. He was now sent to the lonely British isle of St. Helena, in the South Atlantic, 1,200 miles west of Africa. His wife Marie Louise deserted him and his only son was reared in Austria and died as the Duke of Reichstadt in 1832. At St. Helena Napoleon fretted out the remainder of his life, until his death from cancer on May 8, 1821. In 1840, in accordance with his wishes, his remains were taken to France, and he was buried under the dome of the Hôtel des Invalides in Paris.

Napoleon III, Emperor of the French (1808–1873). As a boy in exile, Louis Napoleon dreamed of ruling a French empire as his uncle, the great Napoleon, had done. Although his dream came true at last and he became emperor of the French as Napoleon III, he was poorly equipped either to win or to wear a crown. He bungled two attempts to secure power, and his reign brought disaster to France and humiliation to himself. His name was his principal asset, but he so lacked the genius of Napoleon I that Victor Hugo called him "Napoleon the Little."

He was the son of Louis Bonaparte, younger brother of Napoleon I; his mother was Hortense de Beauharnais, stepdaughter of Napoleon. His father was king of Holland when Louis was born, but within two years he lost his throne, and Hortense took the child to live in France. After the battle of Waterloo, they were exiled, and eventually settled in Augsburg, Germany, where Louis went to school. He finished his education in Switzerland.

During the reign of Louis Philippe, Louis Napoleon twice tried to create a revolt in France. After the first conspiracy, at Strasbourg (1836), the king sent him to the United States, but he soon returned and settled in England. In 1840 with 56 followers he approached Boulogne by sea, hoping to incite the garrison there to march on Paris. He was arrested and sentenced to life imprisonment in a fortress at Ham. Six years later he managed to escape. In 1848 a revolution overthrew Louis Philippe, and the Second Republic was set up. Louis Napoleon hurried to France from England and was elected a deputy to the Assembly. The French people remembered the glories, but had forgotten the hardships of his uncle's reign. They elected Louis president. Four years later he proclaimed himself emperor as Napoleon III. (The Duke of Reichstadt, son of Napoleon I, had been regarded as Napoleon II.)

Thereafter his power was absolute. He gave the people gifts—foundations, public works, holidays—while taking away their rights. When he married the beautiful Eugénie de Montijo, she brought to his court a brilliant social life. Money was plentiful and France was temporarily satisfied to have prosperity replace freedom. The Crimean War (*see* Crimea) was costly, and badly managed. Napoleon III blundered in Italy (*see* Cavour, Count). His attempt to establish Maximilian as emperor in Mexico was foolishly romantic. His entire foreign policy was a failure.

Finally, still seeking glory, he involved France in a war with Germany (*see* Franco-Prussian War).

THIS EARLY SPRING FLOWER WILL BLOOM INDOORS IN WINTER



Cross breeding produced this beautiful narcissus. The poet's narcissus, which bears a single bloom with a crown rimmed in red, was crossed with a many-flowered variety. The text tells you how to grow the narcissus in your home.

This was the end. When the French armies were defeated at Sedan on Sept. 2, 1870, Napoleon III was taken prisoner of war. In Paris the people shouted, "Down with the Empire! Long live the Republic!" Eugénie fled to England. There the fallen emperor joined her after his release at the close of the war. He lived only three years more. His only son was killed in 1879 in a British expedition in South Africa. Eugénie lived on in lonely widowhood for forty years until 1920.

NARCISSUS. The graceful narcissus takes its name from a Greek myth. Narcissus was a beautiful youth, condemned by Aphrodite to fall in love with his own image because he had spurned the nymph Echo. Day and night he gazed at his reflection in a clear pool, until he pined away and died. The gods in compassion then changed Narcissus into a lovely flower, which bent its head over the water.

The narcissus is native to the Old World; and it is often found growing wild in Alpine and English meadows. Because of its beauty and fragrance, its hardiness and early spring blooming, it is a garden favorite everywhere. The plant has a bulb root, from which spring narrow grasslike leaves from one to two feet high. The drooping blossoms are supported on a straight central stalk. They are usually either white or yellow, and have a cup-shaped center called a *corona*, or crown.

The common English daffodil (*Narcissus pseudonarcissus*) bears a single yellow flower and differs from other narcissi in having a long bell-shaped corona. It is also called the "lent lily," or "trumpet narcissus." The poet's narcissus, or pheasant's eye (*Narcissus poeticus*) has a single white flower with a short, red-margined corona. The jonquil (*Narcissus jonquilla*) bears several fragrant golden blossoms. The paper white narcissus carries as many as a dozen all-white flowers on a single stalk. It is a form of *Narcissus tazetta*, a species which includes also the Chinese sacred lily, or joss flower.

The paper white narcissus is so sturdy that it can be grown in winter in our homes. The bulbs should be set in a deep bowl, surrounded with stones to keep them in place, and kept well covered with water. They should be placed in a dark, cool place until the heavy mat of roots has formed and the leaves have started. They then want plenty of sunlight but not too much heat, and if kept in a temperature between 60° to 65° F. they will probably bloom vigorously.

NARCOTICS. Few drugs are more valuable to man than the narcotics—but they are also the cause of much suffering, degradation, and crime. Properly used by physicians, they help to relieve pain or to induce sleep. Large doses are fatal; continued small doses poison the nervous system. The periodic stimulation they give is followed by a deep depression that can be relieved only by ever larger amounts. The control of narcotics is a world problem.

Morphine and Heroin

The most widely used of all narcotics are opium and the drugs derived from it. Opium is obtained from the seeds of the sleep poppy, which is grown chiefly in Asia (*see* Opium). Medicines which contain opium (such as laudanum and paregoric) are still sometimes prescribed by doctors. But opium in its natural state has now been largely supplanted by the drugs derived from it—particularly morphine, which is considered indispensable to the practise of medicine. No drug yet discovered equals morphine in relieving pain, and it produces a deep dreamless sleep from which the patient usually awakes refreshed. But it is used sparingly by physicians, since it is quickly habit-forming. Codein, which is derived from morphine, is milder and not so effective in relieving pain. It is widely used as a sedative for coughs.

Heroin, which is also derived from morphine, is considered the most dangerous of the narcotic poisons. Since it is inferior to morphine for medical use, its manufacture in the United States as well as its importation from abroad are prohibited. Addiction to heroin is the worst form of the drug habit and the most common among criminal classes.

Cocaine, Stimulant and Anesthetic

For ages the natives of Peru and Bolivia have chewed the leaves of the coca shrub for their stimulating effect. Coca is produced also in Java and Ceylon, but is not native to those islands. The drug cocaine, which is obtained from the leaves, was one of the first local anesthetics used by surgeons and dentists, but synthetic drugs have now largely replaced it. Cocaine also is a commonly misused drug. Like morphine and heroin, it causes a deterioration of the nervous system. Its prolonged use brings about tremors, sleeplessness, and emaciation.

Hashish, or Marihuana

The same plant which gives us the useful hemp fiber also furnishes a dangerous narcotic drug (*see* Hemp). The upper leaves and flower of the plant secrete a gum that has an intoxicating effect. This drug has been used for ages by the natives of Asia and Africa. It is called "hashish" by the Arabs; and our English word "assassin" is derived from the name of a murderous Mohammedan sect which used this drug (*see* Assassins). In India it is known as "bhang," and in Mexico as "marihuana." Because of its variable effect, it has little or no use in medicine.

The hemp plant may be found growing as a roadside weed in nearly every state of the Union, and the illegal marihuana traffic is therefore difficult to control. The criminals who engage in it usually mix the drug-bearing leaves with tobacco and make cigarettes which are sold to addicts at a high price.

The Control of Narcotics

Traffic in opium became a large and lucrative business in the 19th century. In 1909 the United States brought about an international conference on the subject at Shanghai; and this was followed by an Opium Convention at the Hague in 1912, a Drug Convention at Geneva in 1925, and the Narcotics Limitation Convention in 1931. These limited the manufacture of narcotic drugs to the amounts required for medical purposes and provided that such drugs can be shipped from one country to another only with the consent of both the exporting and importing governments. Two United Nations groups, the Permanent Central Opium Board and the Drug Supervisory Body, control this lawful traffic. A third group, the United Nations Commission on Narcotic Drugs, does advisory work.

In the United States the suppression of smuggling is one of the important functions of the Bureau of Customs of the Treasury Department, aided by the Coast Guard. The task of preventing unlawful trade in narcotics within the country is assigned to the Bureau of Narcotics, also of the Treasury Department. It administers the Harrison Narcotic Act (1914), which imposes taxes on narcotics and requires the registration of all dealers; and also the Marihuana Tax Act (1937), which provides punishment for anyone handling marihuana without a license. Each state also has laws to control the traffic.

Other Narcotics Used in Medicine

Narcotics which have special uses in medicine but seldom attract addicts include belladonna from the deadly nightshade plant; stramonium, from the thorn apple; and hyoscyamine from the henbane (*see* Poisonous Plants; Poisons).

Narcotics used for the relief of pain are called *anodynes;* and those which induce sleep are known as *hypnotics,* or *soporifics.* The same substance, however, is sometimes used for both purposes. Synthetic drugs used as sedatives are usually called hypnotics rather than narcotics. Some of these are habit-forming; and in large doses they may cause complete unconsciousness (narcosis) and death. Of synthetic hypnotics the most important are the barbiturates, derived from barbituric acid. They include barbital (veronal), phenobarbital (luminal), and other drugs sold under proprietary names. From chloral is derived chloral hydrate ("knockout drops"). (*See also* Anesthetics.)

NASHVILLE, TENN. About Christmas Day, 1779, a few pioneers led by Gen. James Robertson settled on the Cumberland River in middle Tennessee and built Fort Nashborough. The settlement became the town of Nashville in 1784. Its position in a vast, fertile valley with varied resources soon made it Tennessee's second largest city. It has been the state capital since 1843.

Nashville is perhaps proudest of its reputation as "the Athens of the South," won because of its many educational institutions. Among these are Vanderbilt University; George Peabody College for Teachers;

Scarritt College for Christian Workers, Belmont College, David Lipscomb College, Trevecca Nazarene, and for Negroes, the Tennessee Agricultural and Industrial State University, Meharry Medical College, and Fisk University, noted for the world famous Fisk Jubilee Singers.

In "the Athens of the South" Greek architecture has inspired the design of many public buildings. The State Capitol, designed by William Strickland, resembles the classic Erechtheum at Athens. The beautiful War Memorial Building in the center of the business district is Doric in design. The State Office Building, the State Supreme Court Building, and the Federal Post Office are modern adaptations of Greek design. A replica of the Parthenon is in Centennial Park.

Nashville is a commercial and industrial center, linked to all parts of the country by railways, airways, and highways. A municipally-owned river terminal receives barges navigating the nine-foot channel of the Cumberland River. Located in the heart of the TVA area, Nashville obtains cheap electric power. Coal and natural gas in near-by fields also supply industrial fuel. Leading industries are the manufacture of rayon and cellophane, and the printing of religious periodicals. The city also makes iron castings and other metal products.

Among the places of historic interest are replicas of Fort Nashborough and of Fort Negley, a Union fortification built during the Civil War. The tomb of James Polk, 11th president of the United States, is on the capitol grounds. The Hermitage, plantation home of Andrew Jackson, is 12 miles east of Nashville. It is an example of the best architecture of its day and is preserved as a museum. "Old Hickory" died here in 1845.

Nashville was incorporated as a town in 1784 by the North Carolina legislature. It was named for Gen. Francis Nash, a Revolutionary War hero who was killed in the battle of Germantown, Pa. Tennessee was admitted to the Union in 1796, and in 1843 the state legislature made Nashville its permanent capital. On Dec. 16, 1864, a decisive Civil War battle was fought just south of the city when Gen. George H. Thomas attacked and virtually destroyed the Confederate forces under Gen. John Hood (*see* Thomas). Nashville has a mayor-council government. Population (1950 census), 174,307.

NASTURTIUM. The name nasturtium comes from two Latin words, *nasus* and *tortus*. They mean "nose" and "twisted," and together they suggest the pungent fragrance of the flower. The shield-shaped leaves and helmetlike blossoms suggested the scientific name *Tropaeolum*, from a Greek word meaning "trophy."

The yellow, orange, or red flowers bloom singly on climbing or creeping stems, from early summer until the first frost. The plant is a native of South America, and it was introduced into Spain, France, and England in the 16th century. One species produces underground tubers, which South Americans boil and eat like potatoes. The flower buds and young seeds are sometimes pickled and used for seasoning. The English use the leaves as "Indian cress" in salads.

Botanists call the water cress *Nasturtium officinale*, but it is not related to the nasturtium. There are about 20 species of nasturtiums. The best known are *Tropaeolum majus* and *Tropaeolum minus*, meaning "larger" and "smaller" *Tropaeolum*.

THE "NOSE TWISTER" FLOWER



The nasturtium has five petals and five sepals. One sepal is prolonged into a slender spur. The flower is shaped like an ancient Greek helmet; the leaf, like a shield.

NATAL (*nȧ-tăl'*), SOUTH AFRICA. The "Garden Province" of the Union of South Africa is on the southeast coast, facing the Indian Ocean. The coastal strip is subtropical and grows sugar for export. Citrus fruits, tea, tobacco, and cotton are also grown.

Back of the coast the province rises sharply to its western boundary in the Drakensberg ("Dragon's Mountains"), whose 10,000-foot peaks are the highest in South Africa. The somewhat dry, temperate climate of this region is fine for corn, dairy farms, and beef cattle. Mining timbers and a tanning extract are obtained from the wattle, a species af acacia.

Natal is rich in minerals, and it exports coal and manganese. Durban (population, 463,120) is an important coaling station and the leading port. It serves the import and export trade of Rhodesia and of the gold mines of the Witwatersrand. Nearby is the capital, Pietermaritzburg (population, 92,555). The name Natal means "birthday." It was bestowed by Vasco da Gama who discovered the region on Christmas day, 1497. Population (1951 census, preliminary), 2,408,433.

The NATION *and the* NATIONAL SPIRIT

NATION. Most of the world's people live in political groups called *nations*. Men and women go to war for their nations. In peacetime, statesmen strive to protect or to further the interest of their nations. A nation's growth and policy affect business, industry, education, religion, culture, and even recreation. Indeed everyone's daily life is largely linked with his nation's affairs at home and abroad.

The word "nation" comes from the Latin *natus*, meaning "born." Through the centuries it came to mean also "race" and "kindred." Today it means a group of people who have a sovereign government.

The Beginnings of Nations

But this meaning of "nation" did not appear until after the Middle Ages. Then development of printing and expansion of trade lifted people from the narrow life of feudalism. People formerly isolated on manors and in duchies and free cities found they had common interests. This led to vast changes in government which brought people together in larger political groups (*see* Government). Then in the 18th century the American and French revolutions sowed the idea that government belonged to the people.

Some groups with common interests were not able to establish themselves as nations. For example, after the fall of ancient Greece that land was ruled by Turkey for centuries. But the people of Greece had inherited common ties that held them together as a group distinct from the Turks. And so the Greeks could be called a national group, tied by bonds that could eventually create a nation.

The Ties That Form National Groups

Several bonds can draw people together into a national group. One is the *cultural* bond. That is, people have the same traditions, the same language, or the same religion. Second is the *territorial* or *geographic* bond. This means that people in any given region have common interests in making a living from that region. Third is the *racial* or *ethnic* bond, which springs from the common ancestry of a people.

A Modern Nation Is a Sovereign State

The fourth bond that welds a *national group* into a *nation* is the bond of *sovereignty*. Sovereignty means that the group has the power of government. It can make laws and enforce them. That is, in principle, no superior power can rule a sovereign state, or nation.

Actually, the exercise of sovereignty varies. Weak nations may not dare to exercise sovereignty exactly as they like lest stronger nations take offense and act against them. Too, several sovereign powers may form a federation and yield some of their sovereign rights to be used by the federation as a whole. The American Colonies did that when they formed the nation called the United States of America. Today the peoples of the British Empire have a complex arrangement of sovereignty (*see* British Commonwealth).

Varying Examples of "Nationality"

The relative importance of these four bonds varies with each nation since every nation has developed differently. For example, the Swiss form one of the most closely knit nations of Europe. Their Alpine land gives them a territorial and economic bond. Their long history gives them common memories. Their independent republic gives them sovereign government. Yet the Swiss people comprise three more or less distinct ethnic groups—Italian Swiss, French Swiss, and German Swiss.

Greece and the Greeks offer a sharp contrast. *Politically* the Greeks were not a nation while they were under Turkish rule. But *culturally*, *geographically*, and to some extent *ethnically*, they have comprised a "kindred" or "national" group since ancient times. The Poles also show a varying record of nationality. In the last few centuries they have enjoyed only brief periods of political independence. But they possess a close ethnic kinship, speak the same language, and have the same religion and customs.

The National Spirit

To exist and act as a modern nation, people must have a feeling of togetherness and must have a strong sense of loyalty to the nation. The spirit or feeling is called "national spirit," "patriotism," "nationalistic feeling," or "love of country."

The object of people's national spirit is a unique and complex phenomenon for each nation. In the United States, for example, the national spirit arose from devotion to the idea of democracy in government and free enterprise in business. These were the bonds that helped bind Americans into a political nation. For many Americans the national spirit includes a pride that many different cultural and ethnic groups can intermingle coöperatively in one state.

Common Meanings of Nationalism

The word "nationalism" has two broad meanings. It may mean that a sovereign state is interested only in itself, determined to advance at the expense of all other sovereign states. Many sovereign states have pursued this policy. Nazi Germany provided an outstanding example. "Nationalism" may also mean the movement of a subject people to throw off rule by an outside power.

Much of modern history grew out of the attempts of various "nationalist" groups to establish nations. In the 19th century small national groups in the Balkans freed themselves from Turkish rule. The Italians and Germans, who had long lived in many separate political units, formed nations. After the first World War the Austro-Hungarian empire was split apart and small new nations were created out of groups with ethnic and cultural bonds. The second World War brought another surge of nationalism in the Middle East and Far East and resulted in the formation of new nations in those areas.

Indeed seldom can any people become a nation without the drive and the sacrifices given in the spirit of nationalism. But once they become a nation, they have the responsibility of working with other nations for the common good of the world (*see* United Nations).

THE NATIONS OF THE WORLD

Nation	Location	Government	Capital	Area, Sq. Mi.	Population
Afghanistan	Asia	Kingdom	Kabul	245,000	12,000,000
Albania	Europe	People's republic*	Tirana	10,629	1,112,355
Andorra	Europe	Republic	Andorra	191	5,265
Argentina	South America	Republic	Buenos Aires	1,080,000	15,893,827
Australia	Australasia	Dominion	Canberra	2,948,366	8,185,539
Austria	Europe	Republic†	Vienna	32,369	6,903,905
Belgium	Europe	Kingdom	Brussels	11,754	8,512,195
Bhutan	Asia	Kingdom	Punaka	18,000	300,000
Bolivia	South America	Republic	Sucre	420,000	3,028,031
Brazil	South America	Republic	Rio de Janeiro	3,286,000	52,645,479
Bulgaria	Europe	People's republic*	Sofia	42,800	7,022,206
Burma	Asia	Republic	Rangoon	260,000	18,119,000
Cambodia	Asia	Kingdom	Phnom-Penh	52,500	3,748,000
Canada	North America	Const. monarchy	Ottawa	3,845,774	14,009,429
Ceylon	Asia	Dominion	Colombo	25,332	8,103,648
Chile	South America	Republic	Santiago	286,396	5,930,809
China	Asia	Republic‡	.....	1,500,000	385,047,161
Colombia	South America	Republic	Bogotá	439,828	11,266,075
Costa Rica	Central America	Republic	San José	23,000	800,875
Cuba	North America	Republic	Havana	41,634	5,853,898
Czechoslovakia	Europe	People's republic*	Prague	49,373	12,339,674
Denmark	Europe	Kingdom	Copenhagen	16,568	4,281,275
Dominican Republic	North America	Republic	Ciudad Trujillo	19,325	2,135,872
Ecuador	South America	Republic	Quito	212,000	3,202,757
Egypt	Africa	Republic	Cairo	386,000	19,087,304
Ethiopia	Africa	Kingdom	Addis Ababa	350,000	10,079,200
Finland	Europe	Republic	Helsinki	131,500	4,052,577
France	Europe	Republic	Paris	212,659	40,502,513
Germany, East	Europe	Republic†*	Berlin	41,535	18,517,567
Germany, West	Europe	Republic†	Bonn	95,867	49,732,824
Great Britain	Europe	Kingdom	London	94,279	50,369,591
Greece	Europe	Kingdom	Athens	51,000	7,631,124
Guatemala	Central America	Republic	Guatemala City	42,042	2,788,122
Haiti	North America	Republic	Port-au-Prince	10,200	3,111,973
Honduras	Central America	Republic	Tegucigalpa	46,322	1,505,465
Hungary	Europe	People's republic*	Budapest	35,875	9,204,799
Iceland	Europe	Republic	Reykjavik	40,000	144,263
India	Asia	Republic	New Delhi	1,220,000	356,829,485
Indonesia	Asia	Republic	Jakarta	579,000	79,260,000
Iran	Asia	Kingdom	Tehran	628,000	17,000,000
Iraq	Asia	Kingdom	Baghdad	116,000	4,799,500
Ireland	Europe	Republic	Dublin	26,601	2,960,593
Israel	Asia	Republic	Tel Aviv	6,800	1,600,000
Italy	Europe	Republic	Rome	119,764	47,020,536
Japan	Asia	Kingdom	Tokyo	146,190	83,413,723
Jordan	Asia	Kingdom	Amman	34,740	1,250,000
Korea, North	Asia	People's republic*	Pyongyang	47,978	9,102,000
Korea, South	Asia	Republic	Seoul	36,760	20,188,641
Laos	Asia	Kingdom	Vientiane	82,000	1,200,000
Lebanon	Asia	Republic	Beirut	4,000	1,165,200
Liberia	Africa	Republic	Monrovia	43,000	1,600,000
Libya	Africa	Kingdom	Tripoli and Bengasi	680,000	1,060,922
Liechtenstein	Europe	Principality	Vaduz	62	13,757
Luxemburg	Europe	Grand Duchy	Luxemburg	999	290,992
Maldive Islands	Asia	Sultanate	Male (Mave)	115	82,086
Mexico	North America	Republic	Mexico City	767,198	25,581,250
Monaco	Europe	Principality	Monte Carlo	½	20,202
Mongolian People's Republic (Outer Mongolia)	Asia	People's republic*	Ulan Bator	626,000	2,000,000
Nepal	Asia	Kingdom	Katmandu	54,000	6,910,000
Netherlands	Europe	Kingdom	Amsterdam	13,000	9,625,499
New Zealand	Australasia	Dominion	Wellington	103,415	1,939,472
Nicaragua	Central America	Republic	Managua	49,200	1,057,023
Norway	Europe	Kingdom	Oslo	125,000	3,278,546
Oman	Asia	Sultanate	Muscat	82,000	830,000
Pakistan	Asia	Dominion	Karachi	361,007	75,843,000
Panama	Central America	Republic	Panama City	28,576	805,285
Paraguay	South America	Republic	Asunción	155,000	1,251,517
Peru	South America	Republic	Lima	545,000	8,240,000

*Communist †Sovereignty suspended; under Allied control ‡Divided by civil war into Communist (capital, Peiping) and Nationalist (capital, Taipei, Formosa)

THE NATIONS OF THE WORLD (*Continued*)

Nation	Location	Government	Capital	Area, Sq. Mi.	Population
Philippines	Asia	Republic	Quezon City	114,400	19,234,182
Poland	Europe	People's republic*	Warsaw	120,782	24,976,926
Portugal	Europe	Dictatorship	Lisbon	34,604	8,510,240
Rumania	Europe	People's republic*	Bucharest	95,000	15,872,624
Russia (U.S.S.R.)	Europe-Asia	Republic*	Moscow	8,570,600	201,300,000
Salvador, El	Central America	Republic	San Salvador	13,176	1,855,917
San Marino	Europe	Republic	San Marino	38	12,987
Saudi Arabia	Asia	Kingdom	Mecca and Riyadh	800,000	5,500,000
Siam (Thailand)	Asia	Kingdom	Bangkok	200,000	17,324,581
South Africa, Union of	Africa	Dominion	Pretoria	472,494	12,649,702
Spain	Europe	Dictatorship	Madrid	194,800	27,976,755
Sweden	Europe	Kingdom	Stockholm	173,105	7,046,920
Switzerland	Europe	Republic	Bern	15,944	4,714,992
Syria	Asia	Republic	Damascus	54,000	3,135,000
Turkey	Europe-Asia	Republic	Ankara	297,107	20,934,670
United States	North America	Republic	Washington	3,022,387	150,697,361
Uruguay	South America	Republic	Montevideo	72,153	2,353,000
Vatican City	Europe	Papal state	.....	⅙	1,010
Venezuela	South America	Republic	Carácas	352,170	4,985,716
Viet Nam	Asia	Republic	Hanoi	127,000	21,928,809
Yemen	Asia	Kingdom	Sana	75,000	3,335,000
Yugoslavia	Europe	People's republic*	Belgrade	96,000	16,927,275

*Communist.

Member Nations of International Organizations

UNITED NATIONS
Afghanistan
Argentina
Australia
Belgium
Bolivia
Brazil
Burma
Byelorussia
Canada
Chile
China (Nationalist)
Colombia
Costa Rica
Cuba
Czechoslovakia
Denmark
Dominican Republic
Ecuador
Egypt
Ethiopia
France
Greece
Guatemala
Haiti
Honduras
Iceland
India
Indonesia
Iran
Iraq
Israel
Lebanon
Liberia
Luxemburg
Mexico
Netherlands
New Zealand
Nicaragua
Norway
Pakistan
Panama
Paraguay
Peru
Philippines
Poland

UNITED NATIONS (*Continued*)
Russia (U. S. S. R.)
Salvador, El
Saudi Arabia
Sweden
Syria
Thailand
Turkey
Ukraine
Union of South Africa
United Kingdom
United States
Uruguay
Venezuela
Yemen
Yugoslavia

ARAB LEAGUE
Egypt
Iraq
Jordan
Lebanon
Saudi Arabia
Syria
Yemen

BRITISH COMMONWEALTH OF NATIONS
Australia
Canada
Ceylon
India
New Zealand
Pakistan
Union of S. Africa

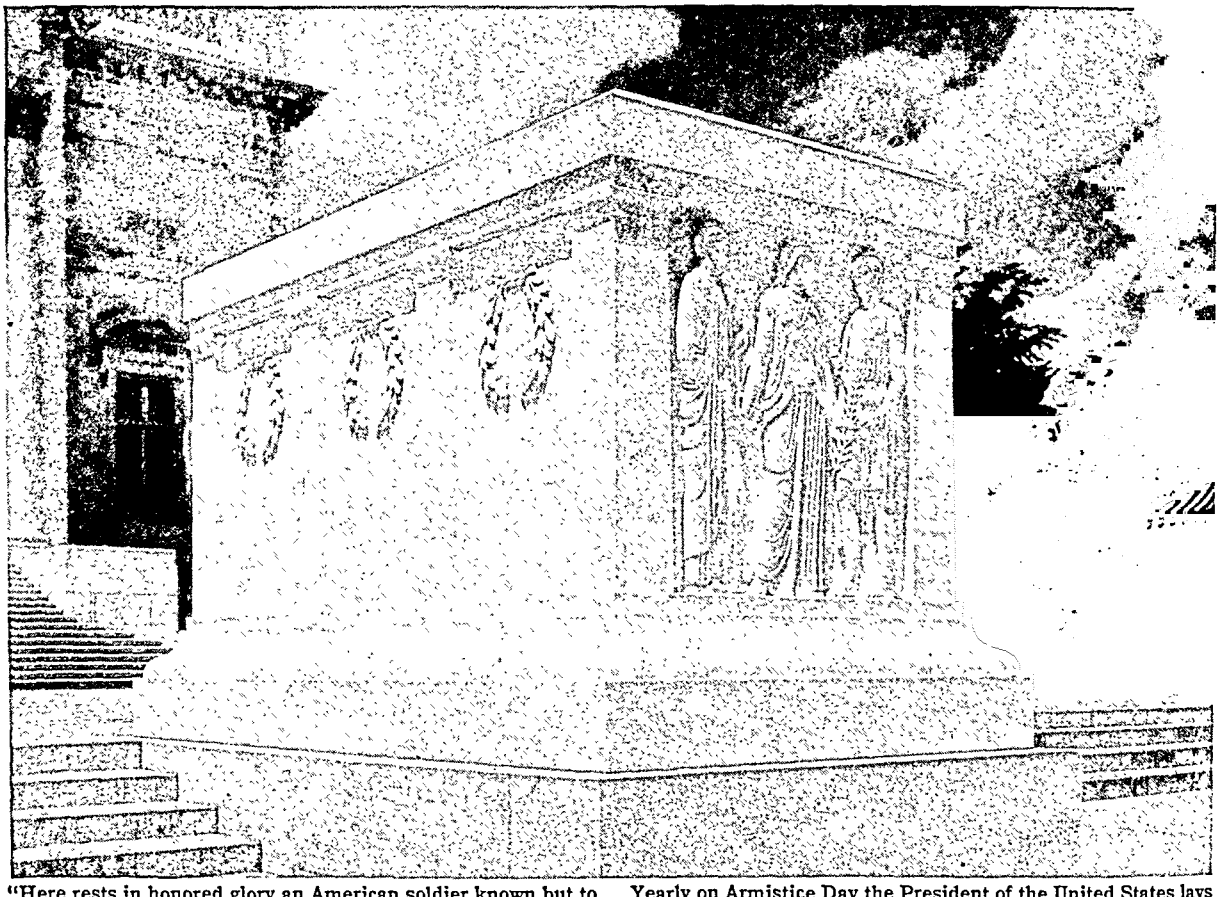
COUNCIL OF EUROPE
Belgium
Denmark
France
Germany, West
Greece
Iceland
Ireland
Italy
Luxemburg
Netherlands
Norway

COUNCIL OF EUROPE (*Continued*)
Saar (associate member only)
Sweden
Turkey
United Kingdom

NORTH ATLANTIC TREATY ORGANIZATION
Belgium
Canada
Denmark
France
Greece
Iceland
Italy
Luxemburg
Netherlands
Norway
Portugal
Turkey
United Kingdom
United States

ORGANIZATION OF AMERICAN STATES
Argentina
Bolivia
Brazil
Chile
Colombia
Costa Rica
Cuba
Dominican Republic
Ecuador
Guatemala
Haiti
Honduras
Mexico
Nicaragua
Panama
Paraguay
Peru
Salvador, El
United States
Uruguay
Venezuela

THE TOMB OF THE UNKNOWN SOLDIER AT ARLINGTON NATIONAL CEMETERY



"Here rests in honored glory an American soldier known but to God," is the inscription on the Tomb of the Unknown Soldier. The sculptured figures represent Peace, Victory, and Valor.

Yearly on Armistice Day the President of the United States lays a wreath on the tomb. Distinguished visitors from abroad pay it the same honor. A soldier is on guard here night and day.

NATIONAL CEMETERIES. The United States honors its military dead by burial in four general types of cemeteries. These are temporary military cemeteries, permanent military cemeteries, national cemeteries, and Army post and other cemeteries.

Temporary military cemeteries are established during hostilities in or near combat areas. They are operated by theater commanders.

Permanent military cemeteries are set aside in foreign countries after hostilities end. They are the charge of the American Battle Monuments Commission. There are eight American military cemeteries for the dead of World War I and 14 for those of World War II. Six of the World War I cemeteries are in France. They are the Aisne-Marne, near Belleau; Meuse-Argonne, at Romagne; Oise-Aisne, near Fère-en-Tardenois; St. Mihiel, at Thiaucourt; Somme, at Bony; and Suresnes, at Suresnes. Flanders Field Cemetery is at Waregem in Belgium. The eighth cemetery is Brookwood, at Surrey in England.

Five of the cemeteries of World War II are located in France. They are Normandy, near St. Laurent; Brittany, near St. James; Lorraine, at St. Avold; Epinal, near Epinal; and Rhone, at Draguignan. Two are in Italy: Florence, near Florence; and Sicily-Rome, at Nettuno. Two others are in Belgium: Henri-Chapelle, near Henri-Chapelle; and Ardennes, near Neuville-en-Condroz.

The remaining cemeteries are: Cambridge, near Cambridge, England; Netherlands, at Margraten, Netherlands; Luxemburg, near Hamm, Luxemburg; North Africa, at Carthage, Tunisia; and Manila, at Manila, Philippines. The American Battle Monuments Commission also administers a cemetery in Mexico City for American dead of the Mexican War.

National cemeteries are permanent cemeteries in the United States or its possessions. There are almost 100 such burial grounds. Among them are three national overseas cemeteries, principally for casualties of World War II. They are at Honolulu, Hawaii; San Juan, Puerto Rico; and Sitka, Alaska. Most of the national cemeteries are under the supervision of the Department of the Army. The rest are under the National Park Service.

The best known is Arlington National Cemetery across the Potomac River from Washington, D. C., created in 1864. The first to be buried there were a Union and a Confederate soldier, placed side by side. Among those buried there are Gen. Philip Sheridan, Adm. George Dewey, Rear-Adm. Robert E. Peary, Gen. John J. Pershing, and Maj. Pierre Charles L'Enfant, who drew the plans for the city of Washing-

ton. William Howard Taft was the first president interred there. Army and Navy nurses and the wives of officers and enlisted men may be buried in Arlington.

About 78,000 graves on the hillsides are marked by simple stones. Here and there monuments stand above graves of famed military men. Services are held in the beautiful marble amphitheater. The Lee mansion nearby was built by George Washington's stepson, John Parke Custis, and was the home of Robert E. Lee. It is a national memorial.

The Tomb of the Unknown Soldier is Arlington's outstanding memorial. Precautions were taken to insure that the Unknown Soldier was an unidentified American killed in action. On Oct. 24, 1921, in France, a noncommissioned officer made the final choice by placing flowers on one of four caskets, each containing the body of an unidentified American. The Unknown Soldier was laid in the tomb on Armistice Day. In 1946 Congress authorized the Army to choose an unknown soldier of World War II, but international conditions postponed the selection.

The National Park Service manages national cemeteries in these historic areas: Gettysburg, in Pennsylvania; Antietam, in Maryland; Battleground, in Washington, D. C.; Fort Donelson, Shiloh, and Stones River, all in Tennessee; Fredericksburg, Poplar Grove, and Yorktown, all in Virginia; and Vicksburg, in Mississippi. There are cemetery sections in Andrew Johnson and Custer Battlefield national monuments in Tennessee and Montana respectively, and in Chalmette National Historical Park in Louisiana.

Army post cemeteries and other cemeteries are small local burial grounds at Army posts, camps, or stations, or at facilities of the Air Force, Navy, Veterans' Administration, and other government units.

NATIONAL DEBT. A government raises money in two ways. It may tax its citizens and it may borrow. When a government spends more than its citizens can pay in taxes, it gets the money by borrowing. Hence it increases its national debt. Usually a nation borrows by issuing bonds. If money is borrowed from citizens or banks at home and is payable in the nation's own currency, it is called an internal debt. If money is borrowed from another country and is paid in that country's currency, it is an external debt.

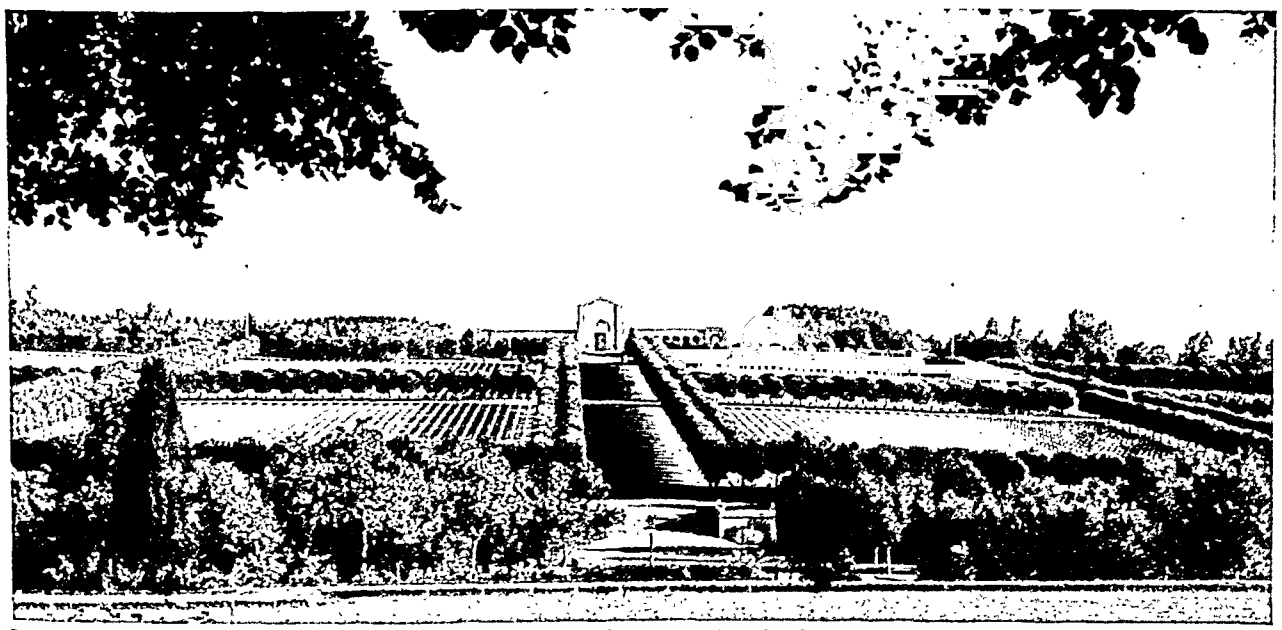
The national debt of the United States was created when the federal government assumed the states' debts and funded the cost of the Revolutionary War. It was 75 million dollars in 1791. By 1835 this was almost paid off, but after the Civil War the debt rose to 2 billion. It was down to one billion in 1899 and remained almost stationary until World War I. During this and World War II the United States and other nations greatly increased their national debts, as follows:

COUNTRY	AFTER WORLD WAR I	AFTER WORLD WAR II
United States	27 billion dollars	279 billion dollars
Great Britain	8 billion pounds	26 billion pounds
France	230 billion francs	2,041 billion francs*
Russia	35 billion rubles	No reliable figure
Italy	61 billion lire	1,268 billion lire*
Germany	172 billion marks	383 billion reichsmarks

*Includes only internal debt

Before World War II the legal limit of the United States national debt was 45 billion. The costs of the war forced Congress to raise this limit successively to an all-time high of 300 billion in 1945. In 1946 the ceiling was reduced to 275 billion but the huge cost of the Korean war forced Congress to consider extending the limit to 290 billion.

HERE SLEEP THE BRAVE IN MEUSE-ARGONNE CEMETERY



Largest of the American military cemeteries in Europe is Meuse-Argonne Cemetery near Romagne, France. On the sloping hillside before the Memorial Chapel some 14,000 dead of World War I lie buried. It was in the Meuse-Argonne area that the American First Army in 1918 hammered its way for 43 days in the greatest battle in American history up to that time. The Germans retreated to Sedan, and four days later the war came to an end with the signing of the Armistice.



The United States is rich in national parks and other recreational areas as this map shows. The article on National Parks describes these playgrounds. It also indicates their location by letters and numbers in parentheses, which correspond to the grid letters and numbers on the border of this map.

PLAYGROUNDS of TWO NATIONS



Here, in the Great Smoky Mountains National Park, wave after wave of rounded hills rolls into the distance like a turbulent blue sea. The Cherokee Indians named these mountains for the smoky haze that always envelops them. Although motor highways lead to this "roof top of eastern America," many thousands of acres in the park are still untouched wilderness.

NATIONAL PARKS AND NATIONAL MONUMENTS. The idea of preserving the wonderlands of nature for the benefit of all the people is an American inspiration. Formerly the choicest lands of a country were reserved in princely forests and parks for the privileged few. Today every citizen of the United States shares in the ownership of towering mountain peaks and dizzy canyons, of forests, glaciers, and waterfalls. In other countries too the United States national park system has served as a model, inspiring governments to set aside great areas as wild-life sanctuaries and places of recreation.

How the Park System Began

The story of the national parks goes back to 1870, when the Washburn-Langford-Doane Expedition discovered the marvelous Yellowstone region. As these men sat around a campfire at the junction of the Firehole and Gibbon rivers discussing how they might divide their find, Cornelius Hedges, later governor of Montana Territory, suggested that it was too great to be used for personal gain. He proposed that the government should make the tract a national playground.

This idea was vigorously urged by Hedges and Nathaniel P. Langford as soon as they returned to civilization. The following summer the government sent the geologist Dr. F. V. Hayden to investigate the region. His enthusiastic support, added to the growing popular demand, won the approval of Congress. In 1872 President Grant signed the bill which made Yellowstone a "pleasuring ground for the benefit and enjoyment of the people." This was the first national park. Hot Springs in Arkansas had been set aside in 1832 as a government reservation to keep its medicinal waters from private exploitation, but it did not become a national park until 1921.

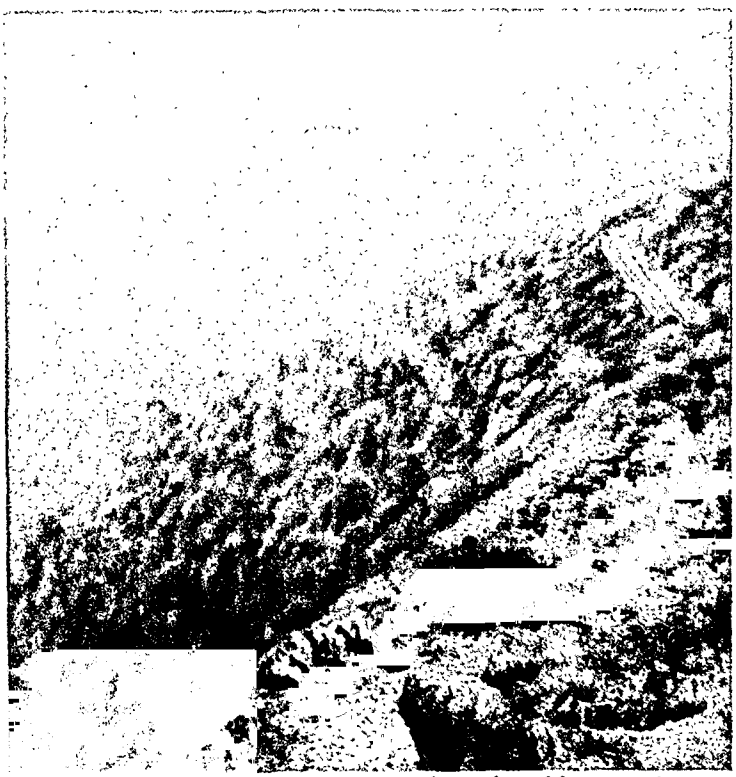
The parks are created by act of Congress. They may be established on lands already owned by the government, as in the case of most of the western parks. Or the lands in a proposed area may be deeded to the government. The Great Smoky Mountains National Park, for example, was given to the nation by the combined efforts of the states of Tennessee and North Carolina, public-spirited citizens, and the Laura Spelman Rockefeller Foundation.

National Monuments

As settlement and industry spread to every corner of the country, there was a growing feeling that the government should save for the people not only scenic areas but also treasures of archeology, botany, geology, and history. The Antiquities Act of 1906 pro-

vided for an enlarged park system. It authorizes the president to set apart as national monuments federal land containing "historic landmarks, historic or prehistoric structures, and other objects of historic or scientific interest." The national monuments are smaller than the parks, except Katmai, which is nearly as large as Connecticut; Glacier Bay, larger than Rhode Island and Delaware combined; and Death Valley, covering about 3,000 square miles.

TRAIL RIDERS IN SHENANDOAH PARK



In Shenandoah National Park, horsemen enjoy a view of forests and mountains bathed in the blue haze that gives the Blue Ridge its name. This is a part of the 2,050-mile Appalachian Trail from Maine to Georgia.

In 1933 a presidential executive order gave the National Park Service control of military parks, battlefield sites, cemeteries, and other memorials maintained by the Departments of War and Agriculture.

Also in 1933 the National Park Service began supervision of the National Capital Parks. This park system consists of hundreds of units in the District of Columbia, Virginia, Maryland, and West Virginia. In Washington, D. C., it includes the White House and the President's Park, and many parks, statues, and memorials. The old 185-mile Chesapeake and Ohio Canal, with its 22-mile restored section between Georgetown, D. C., and Seneca, Md., is in the system.

National Historic Sites

The Historic Sites Act of 1935 permitted the secretary of the interior to acquire "historic American sites, buildings, objects, and antiquities of national significance." He may also enter into agreements for the co-operative preservation and use of sites that are owned by states, corporations, or individuals.

The Salem Maritime National Historic Site, Mass., became the first historic site in 1938. It includes the Old Custom House where Nathaniel Hawthorne worked and memorials of New England maritime history. Hopewell Village, Pa., an 18th-century iron-making community, became a historic site the same year.

The Adams National Historic Site is the home of Presidents John Adams and John Quincy Adams. Hampton in Maryland is an 18th-century Georgian mansion. In Hyde Park, N. Y., is the palatial Vanderbilt Mansion of the late 1800's and the Home of Franklin D. Roosevelt.

Federal Hall Memorial in New York City is the site of the first United States capitol. The Old Philadelphia Custom House in Pennsylvania was the Second Bank of the United States over which President Jackson and the Whigs disputed.

Fort Raleigh on Roanoke Island, N. C., is the site of the first attempted English settlement in America in 1585–87. In Missouri is the Jefferson National Expansion Memorial, dedicated to the nation's territorial growth. The scene of the battles of First and Second Manassas, or Bull Run, (1861 and 1862), is now the Manassas National Battlefield Park in Virginia. In Puerto Rico is San Juan National Historic Site, preserving 16th-century Spanish forts.

National historic sites not owned by the federal government include Touro Synagogue in Newport, R. I., the oldest synagogue in America, built in 1763; Dorchester Heights in Massachusetts, where American batteries aided in driving the British from Boston in 1776; Saint Paul's Church in Mount Vernon, N. Y., important in connection with the Zenger "freedom of the press" trial; Gloria Dei (Old Swedes' Church) in Philadelphia, Pa., the second oldest Swedish church in the nation, founded in 1677; Jamestown, Va., site of the first permanent English settlement in North America.

Chicago Portage in Illinois preserves the portage discovered by Marquette and Joliet. Grand Portage in Minnesota is the old portage to the Northwest. In Oregon City, Ore., is McLoughlin House, home of Dr. John McLoughlin, the "father of Oregon." San Jose Mission in San Antonio, Tex., is a frontier Spanish mission. The Virgin Islands National Historic Site consists of public buildings commemorating the colonial development of the islands.

The Historic Sites Survey has made a nation-wide study of historic buildings and sites. The Historic American Buildings Survey has recorded thousands of early American structures. Architectural photographs and measured drawings of those buildings are kept in the Fine Arts Division of the Library of Congress.

The National Park Service

The National Park Service, a major bureau of the Department of the Interior, was established in 1916

to maintain the parks. It builds roads, trails, and living accommodations, which vary from hotels to camping grounds. Transportation and living utilities are operated privately, under government franchise and supervision. The chief official of each park is the resident superintendent. He is assisted by a force of permanent park rangers, which is increased in summer by temporary rangers and naturalists. The rangers enforce the regulations which make the parks wild-life sanctuaries. No hunting is permitted, and the natural features may not be disturbed in any way.

A valuable feature of the park system is the guide and lecture service. Ranger naturalists conduct parties on the park trails and give informal talks in the evening. There are museums designed to interest the average visitor in finding out for himself just what the region has to offer. Some of the parks and monuments are of such great scientific interest that universities use them as outdoor classrooms in which to conduct summer schools.

Nominal admission fees are charged in certain of the parks and monuments. In others higher fees are charged for automobile permits, and in caves and various archeological and historical areas there are small fees for guide service.

Parks Attract Millions of Visitors

Recreational travel within the United States is "big business," involving the expenditure of billions of dollars annually. Among the chief attractions for tourists are the national parks and monuments, which alone draw many millions of visitors each year. Most of the people in the United States live within easy reach of some national recreation area, and many new projects are being developed.

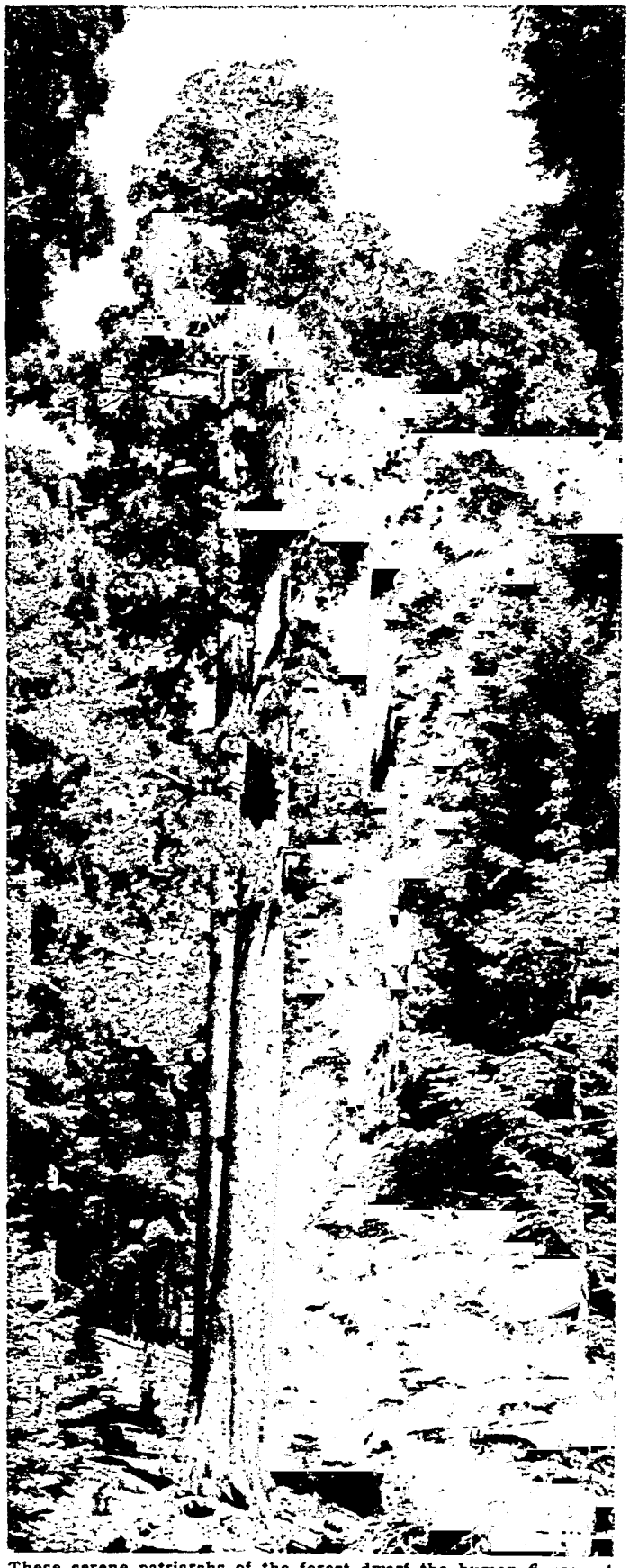
Most people believe that once a national park or monument is established, it is safe thereafter. That is not always so. Pressure is exerted on the Department of the Interior from many groups whose special interests would damage or destroy the park. A dam built across a stream on the park borders may wipe out its finest features by submerging them under water. Lumbering of the forests, mining, sheep and cattle grazing would injure the area.

To help maintain the high standards of the park system, the National Parks Association was established in 1919. It is a non-profit organization, supported by membership dues and donations. It works with the Federal government to prevent commercialization of the parks and to promote the preservation of new areas of wilderness country. It publishes the quarterly *National Parks Magazine* and books, including 'Exploring Our National Parks and Monuments' and 'Exploring the National Parks of Canada'.

The National Parks and Monuments

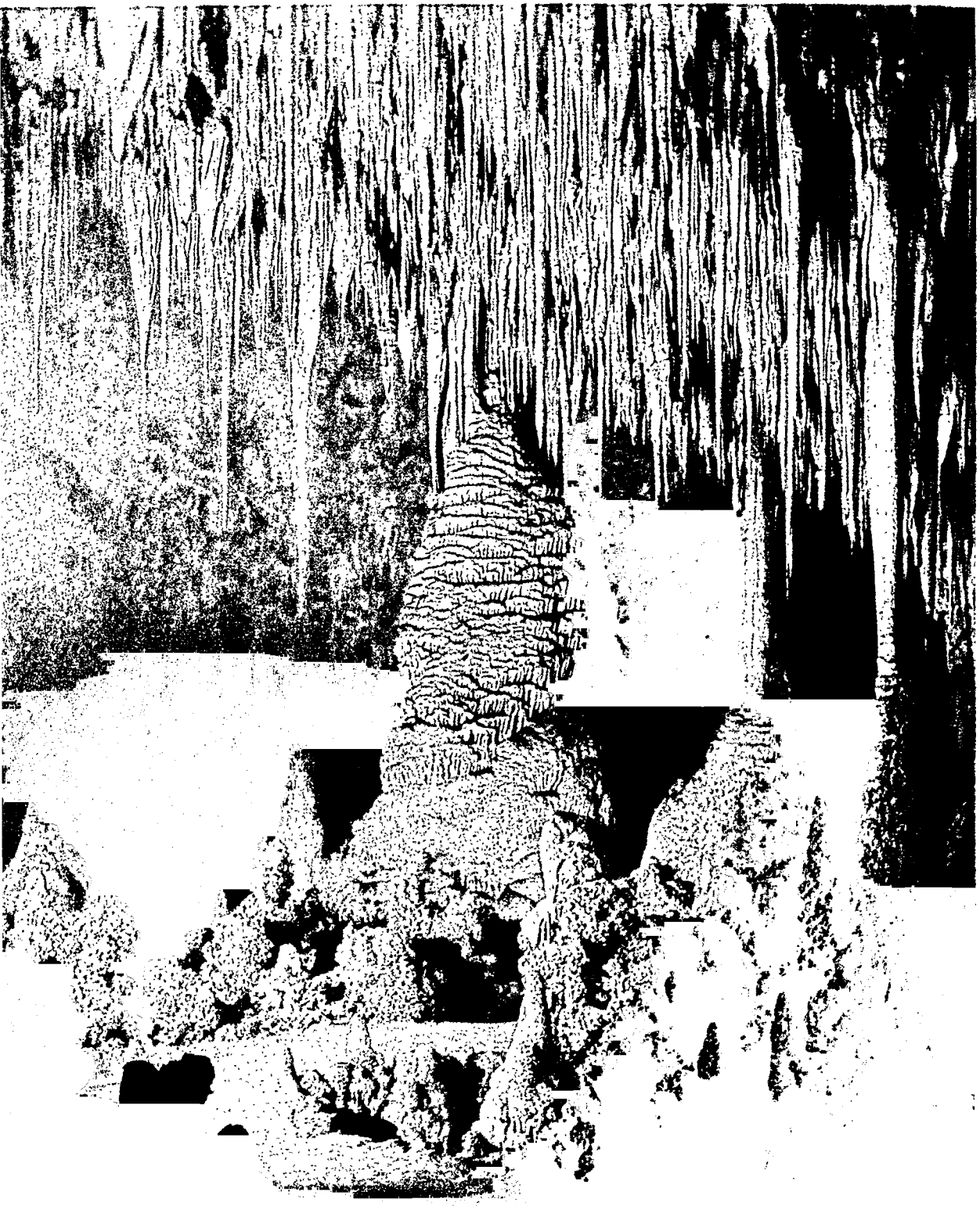
The National Parks (N.P.), National Historical Parks (N.H.P.), and National Monuments (N.M.) are listed beginning on page 30.

BIG TREES OF SEQUOIA PARK



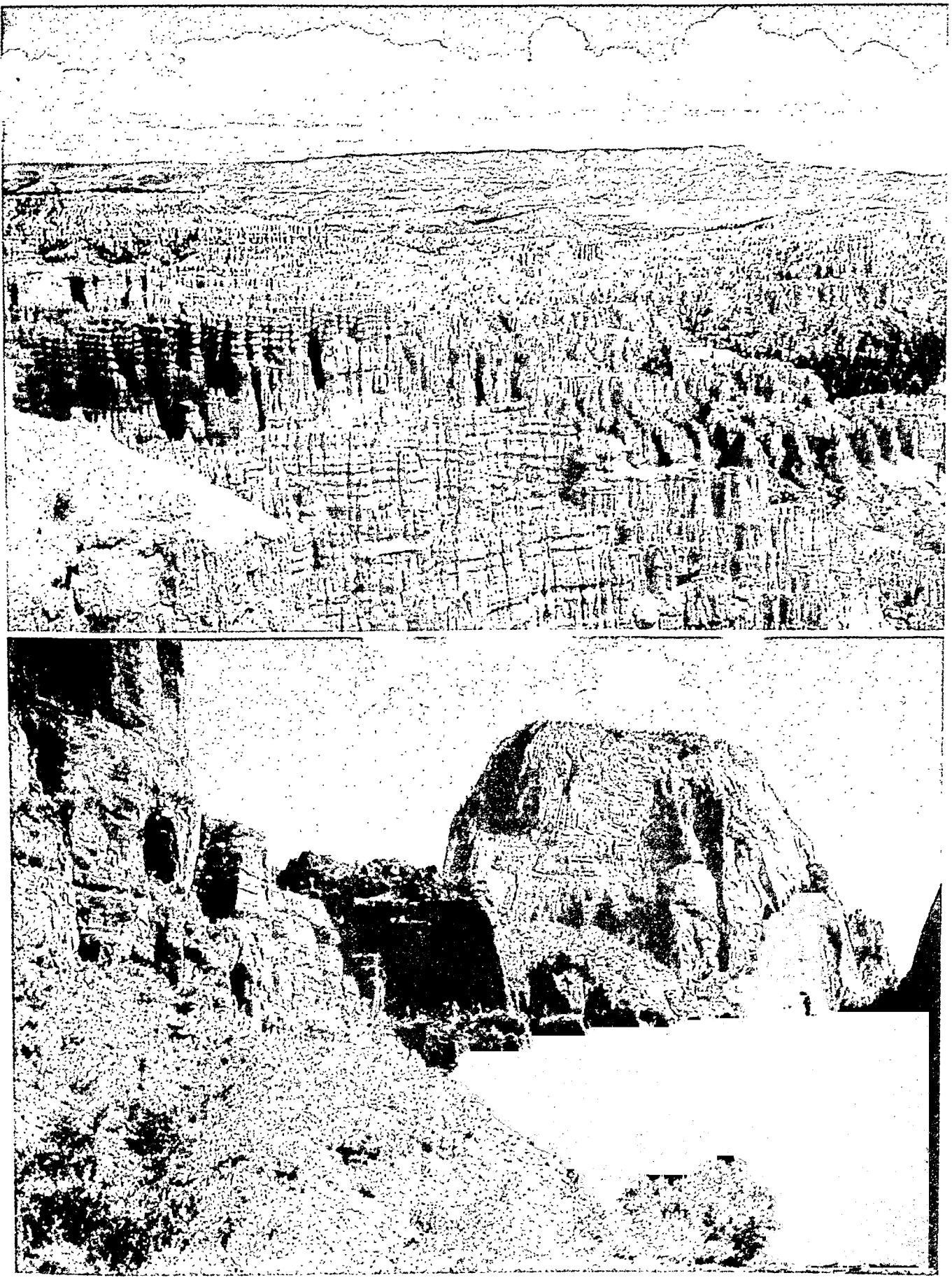
These serene patriarchs of the forest dwarf the human figures at their feet. They are among the oldest and largest of living things.

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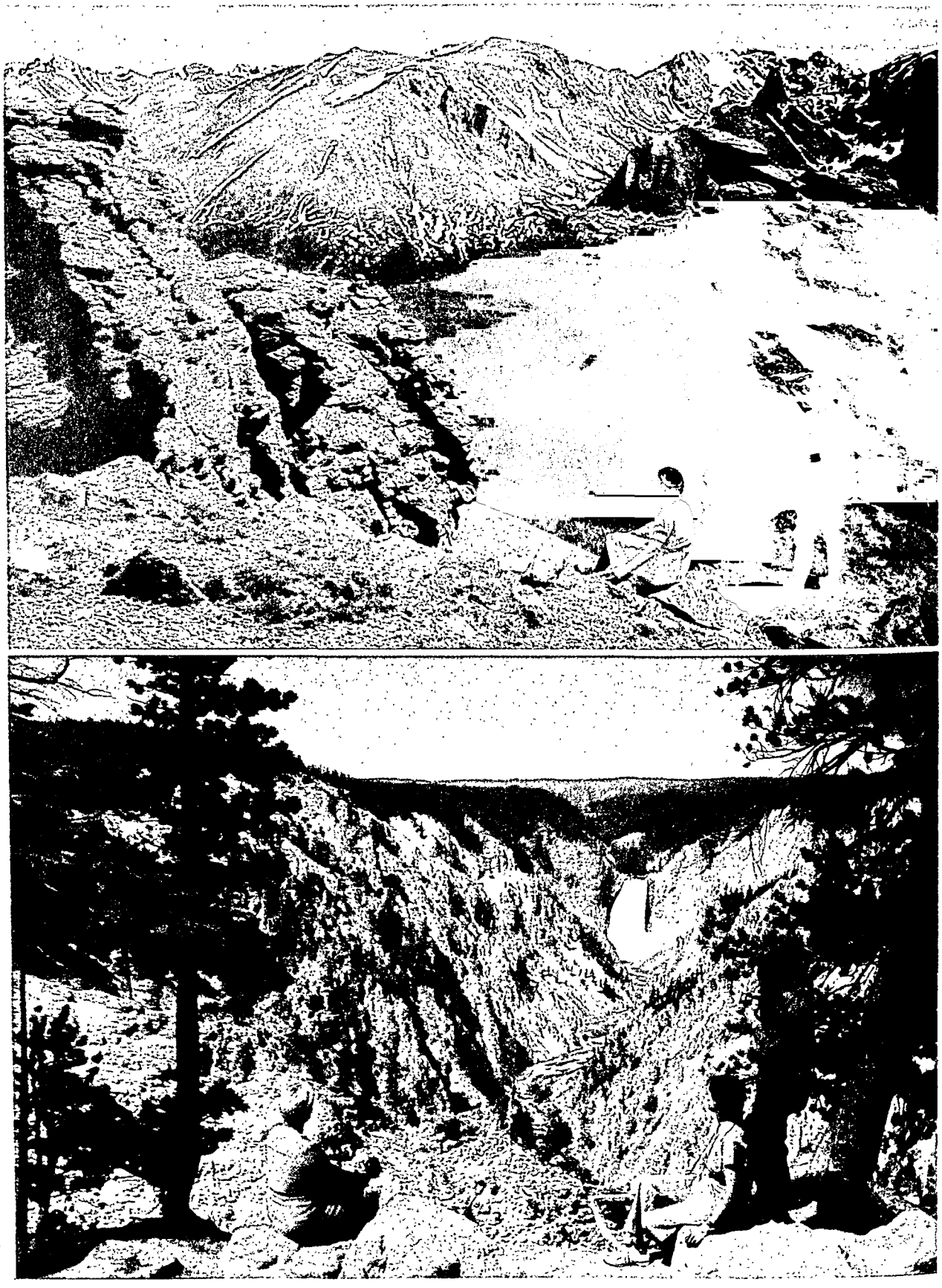
THE TEMPLE OF THE SUN—CARLSBAD CAVERNS

From the ceiling hang stone icicles colored by the photographer's lights in soft tones of amber and lilac; from the floor rise ponderous pillars—all created by deposits from drops of water falling for centuries like a slow and endless rain.



COLORFUL CANYONS OF SOUTHWESTERN UTAH

Bryce Canyon (above) is a horseshoe-shaped bowl filled with a maze of strangely eroded and brilliantly tinted rock forms. The Great White Throne in Zion National Park (below) lifts its majestic mass nearly 2,500 feet above the canyon floor.



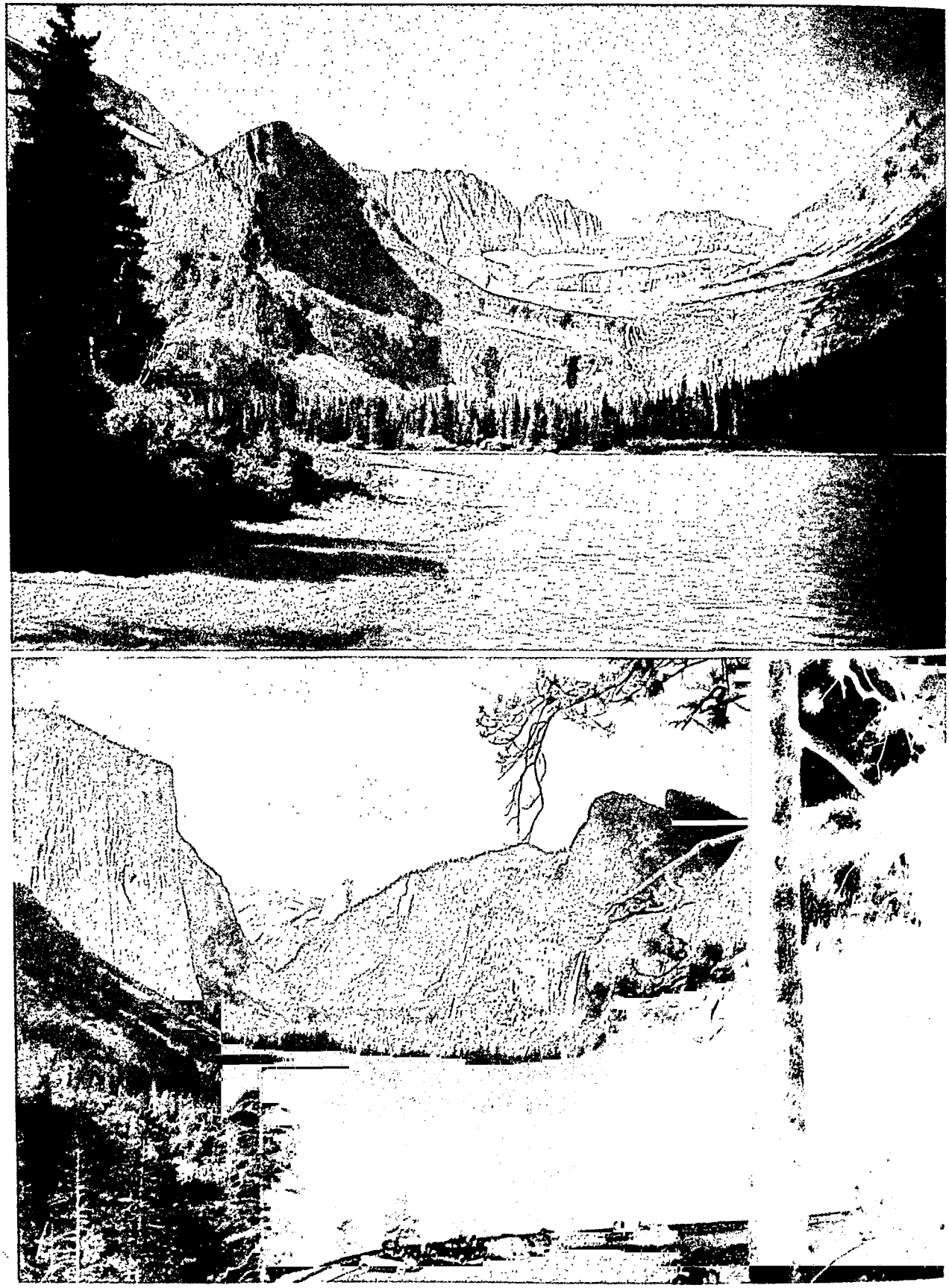
AMONG THE SILENT HEIGHTS OF THE CONTINENT

Rocky Mountain National Park (above) embraces the precipitous Front Range of the Rockies. In Yellowstone Park (below), Artist Point provides a spectacular view of the Grand Canyon of the Yellowstone and the 300-foot Lower Falls.



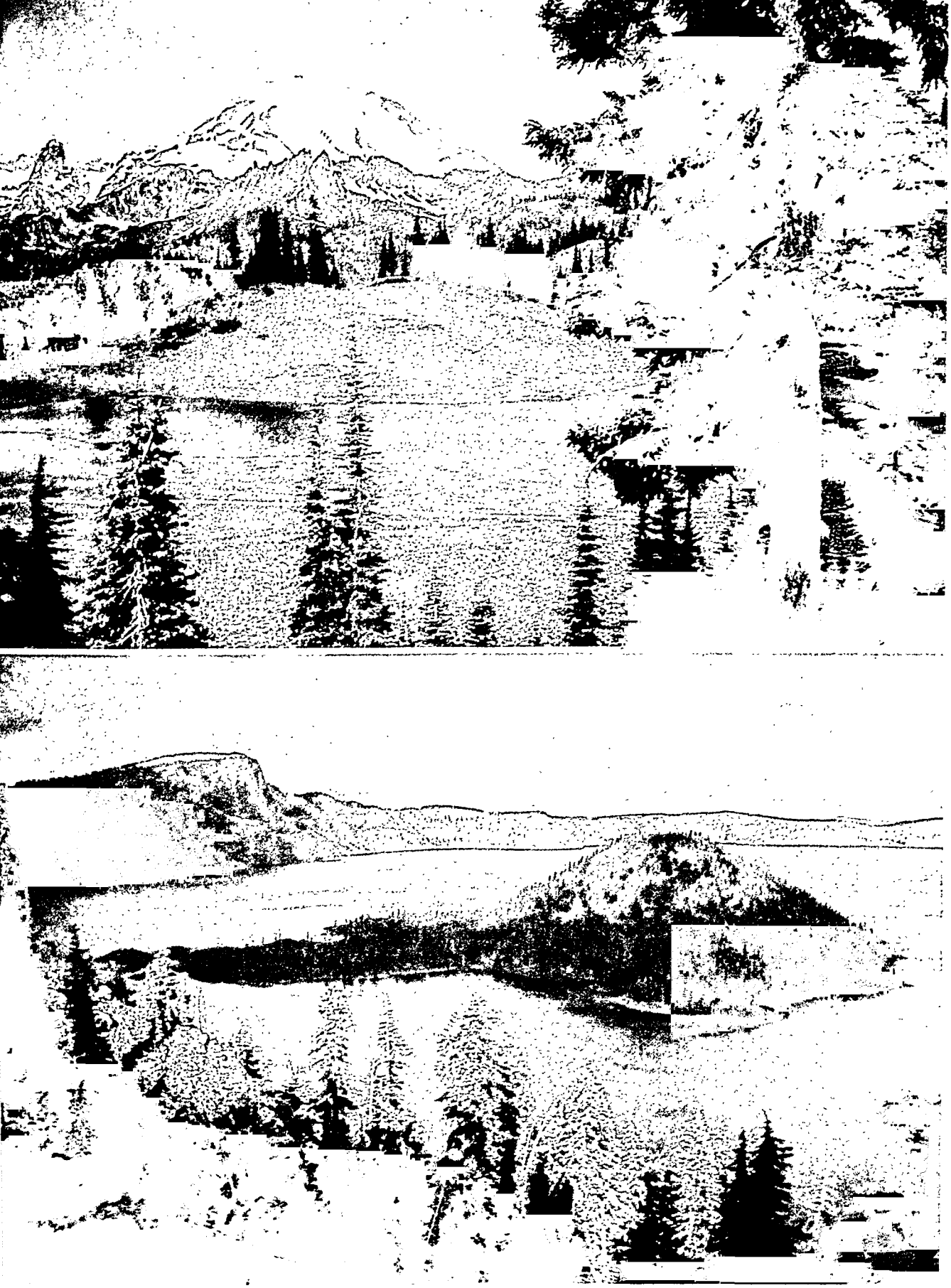
THE MIGHTIEST OF ALL CANYONS

These photographs give some idea of the awe-inspiring size of the Grand Canyon of the Colorado River, the beauty of its changing colors, from the rose-reds and grays of a clear afternoon to the mauve and purple tints of a hazy morning.



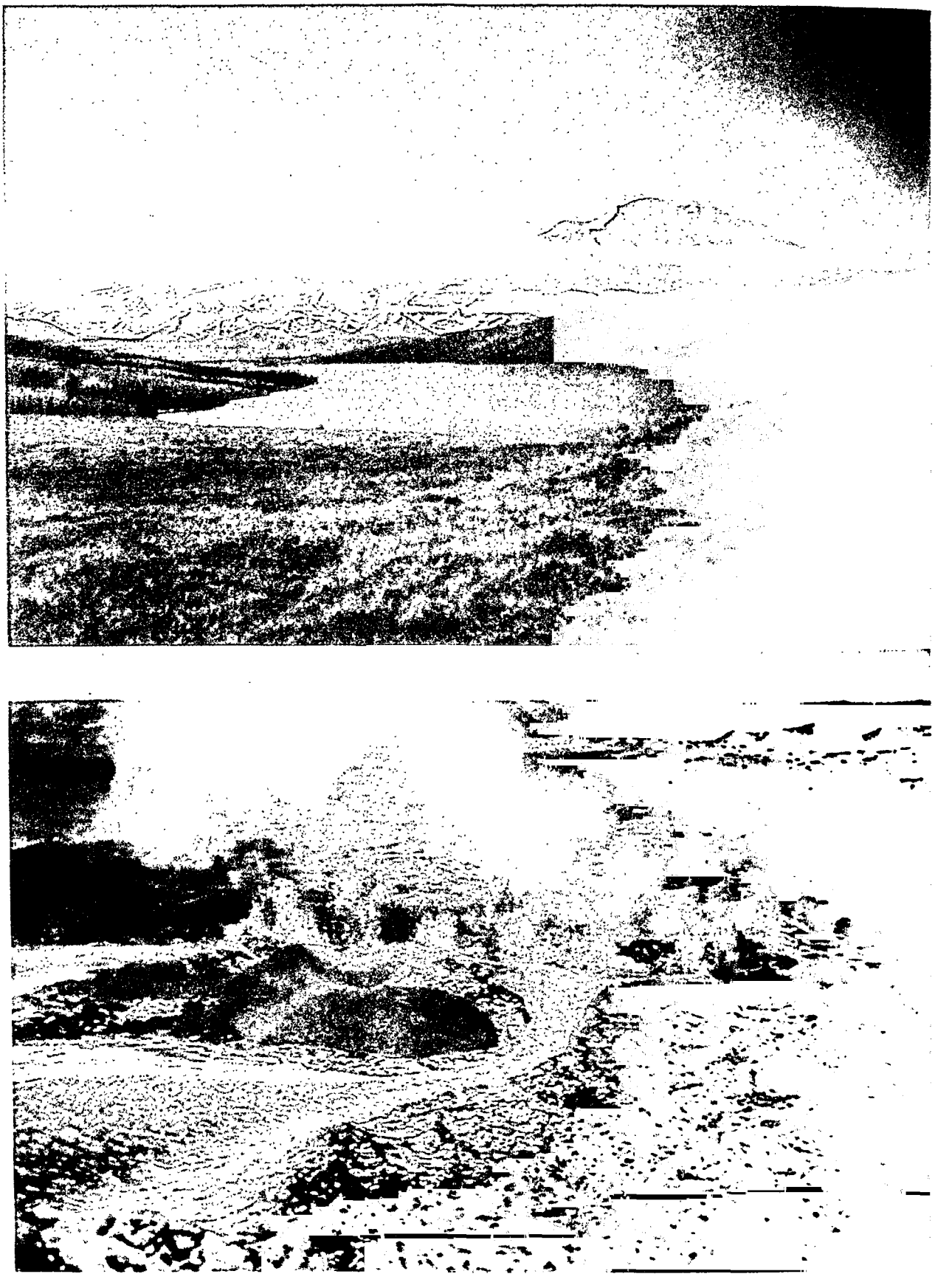
WONDERLANDS CARVED BY GLACIERS

Typical of Glacier National Park (above) are these lofty ice fields, rounded, hanging valleys, and blue glacial lakes. In the Yosemite valley (below) towering granite walls and great leaping waterfalls suggest a magic land of giants.



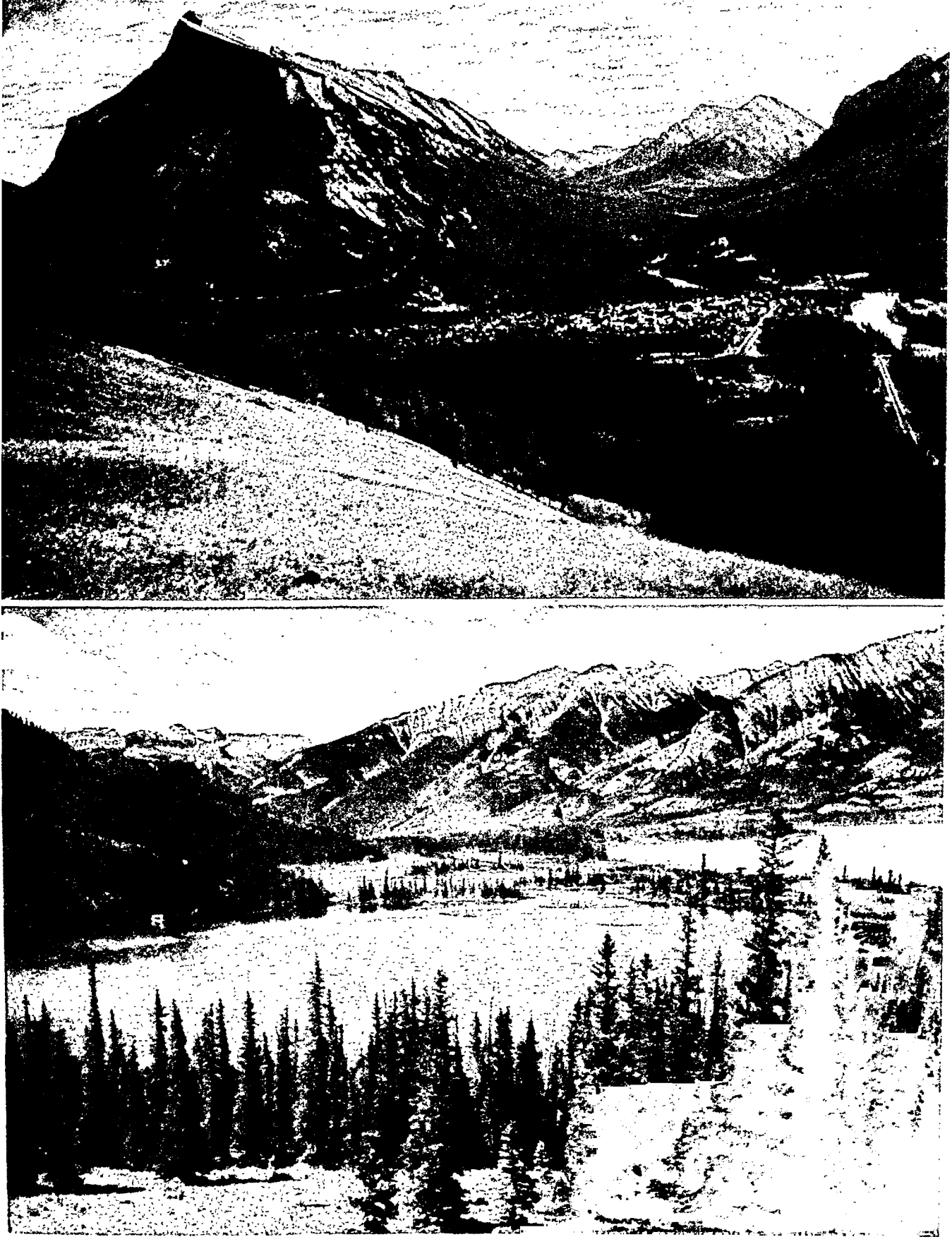
EXTINCT VOLCANOES OF THE PACIFIC COAST

Mount Rainier (above) is a truncated volcanic cone in central Washington. Crater Lake (below) in Oregon and Wizard Island, the miniature volcano in the foreground, lie in the mouth of an ancient volcano whose summit collapsed.



FROM THE GLACIERS OF ALASKA TO THE VOLCANOES OF HAWAII

Across the flower-strewn Alaskan meadows (above) Mount McKinley, the highest peak in North America, lifts its snowy head over the clouds. Below, in Hawaii National Park, Mauna Loa spouts lava and incandescent rock and ash.



TWO OF CANADA'S ROCKY MOUNTAIN PARKS

The town of Banff in the Bow River valley (above) lies in Banff National Park in western Alberta. Jasper Park adjoins it on the north and contains Jasper Lake (below), through which flows the Athabaska River, head stream of the Mackenzie.

Abraham Lincoln N.H.P., 1916, central Kentucky, near Hodgenville, 117 acres. The one-room log cabin in which Abraham Lincoln was born, enclosed in a granite memorial building. Sunken gardens and granite stairs leading up over terraces make an impressive approach to the shrine. The park includes also a part of the Sinking Spring Farm once owned by Thomas Lincoln. (For picture of park, *see* Kentucky; *see also* Lincoln.) (H 4)*.

Acadia N. P., 1919, Maine coast, 29,978 acres. Includes part of granite, sea-girdled Mount Desert Island and the bold headland of Schoodic Point. Somes Sound almost bisects the island, dividing into two groups its dozen or more low mountains. Cadillac Mountain, one of the highest points on the eastern coast of North America (1,532 feet), commands a magnificent view of sea and rugged coast. Wave-battered cliffs, hollowed at their base into thunderous caves, contrast vividly with the quiet interior of the island, where fresh-water lakes reflect the "murmuring pines and the hemlocks" of the forest that Evangeline knew. For this was once a part of the French colony of Acadia (*see* Acadia). Across Frenchman Bay, Schoodic Point extends farther out into the open sea than any other point on the eastern coast. Samuel de Champlain discovered the island in 1604 and named it "l'Isle des Monts Deserts." In 1916 the United States government established it as Sieur de Monts National Monument. Three years later it was made the Lafayette National Park, the first national park in the Eastern states. In 1929 it was given the present name. A great forest fire in 1947 burned a large area of the park and Mount Desert Island (J 2)*.

Ackia Battleground N. M., 1938, Mississippi, near Tupelo, 49 acres. Site of the palisaded Indian village of Ackia, where on May 26, 1736, a band of English tradesmen and their Chickasaw allies defeated the French and Choctaws. The battle checked the movement of the French to extend their Louisiana empire eastward from the Mississippi River (G 5)*.

Andrew Johnson N. M., 1942, Greeneville, Tenn., 16 acres. The home, tailor shop, and grave of the 17th president of the United States (*see* Johnson, Andrew) (H 4)*.

Appomattox Court House N. H. M., 1940, Virginia, 968 acres. Scene of surrender of Confederate army under Gen. Robert E. Lee to Union army under Gen. Ulysses S. Grant in 1865. (*See* Grant; Lee, Robert E.) (I 4)*.

Arches N. M., 1929, Utah, 34,050 acres. Massive red sandstone eroded by desert winds into fantastic forms. The monument contains five sections—the Windows, Courthouse Towers, Devil's Garden, Klondike Bluffs, and Delicate Arch (C 4.)*.

Aztec Ruins N. M., 1923, northwestern New Mexico, 27 acres. Remains of a prehistoric American Indian town built in the 12th century, including an E-shaped pueblo apartment dwelling, three stories high, containing about 500 rooms (C 4)*.

Badlands N. M., 1939, southwestern South Dakota, 103,548 acres. An eroded region between the White and the Cheyenne rivers. The heavy, nonporous clay soil is so steep that it washes badly and is bare of vegetation. Intermittent streams and torrential rains from cloudbursts have carved it into a maze of winding canyons, towering pinnacles, ridges, and isolated buttes. The Great Wall presents an impenetrable barrier miles long. Its top is serrated into countless towers, its sides scored with precipitous gulches. Horizontal bands of colored rocks stripe the grayish-white clay with red, purple, yellow, and green. Each color layer may be traced for many miles. The fossil beds in this area are among the largest known. They have yielded the remains of the saber-toothed tiger, three-toed horse, camel, giraffe, and rhinoceros. Only prairie dogs, coyotes, and jack rabbits roam the badlands today. (*See* South Dakota.) (E 3)*.

Bandelier N. M., 1916, north central New Mexico, 27,049 acres. Ruins of prehistoric Indian cliff dwellings and pueblos in the canyon of the Rito de los Frijoles and on the Pajarito Plateau. *Kivas*, or ceremonial chambers, artificial caves, and stone sculpture have also been uncovered. (*See* Cliff Dwellers.) (D 5)*.

Big Bend N. P., 1944, southwestern Texas, 692,305 acres. The last great wilderness in Texas, where the Rio Grande bends to the northeast. The region is a semi-arid plain from which rise the southernmost spurs of the Rocky Mountains. The Chisos Range is the highest and most rugged (Emory Peak, 7,835 feet). Virgin forests cover the mountains and harbor many wild animals. A dramatic view from the south rim of the mountains overlooks 200 miles of Mexican and American desert and mountain country. Five thousand feet below, through steep-walled canyons, winds the river. The Mexican government plans to set aside a tract across the river to form an international peace park (*see* Rio Grande) (D 6)*.

Big Hole Battlefield N. M., 1910, western Montana, 200 acres. Site of the battlefield where a small force of United States troops defeated a much larger band of Nez Percé Indians, Aug. 9, 1877 (C 2)*.

Black Canyon of the Gunnison N. M., 1933, west central Colorado, 13,176 acres. Ten miles of the wildest and most spectacular stretch of a 50-mile gorge carved through the San Juan Mountains. It is 1,725 to 2,724 feet deep and 2,500 feet at its widest point (C 4)*.

Bryce Canyon N. P., 1928, southwestern Utah, 36,010 acres. The Paunsaugunt Plateau ends abruptly in the sheer Pink Cliffs, which drop a thousand feet to the Paria Valley below. Cutting back into the plateau from these southward-facing cliffs are 14 bowl-shaped, or box, canyons. The largest is Bryce Canyon, three miles long, two miles wide, and a thousand feet deep. It is approached from the top of the plateau, from which one gazes down into a maze of pink, red, and cream-colored sculptured rock. Platforms and terraces, domes, spires, and temples fill the great bowl with a confusion of colorful forms. The Paiute Indians gave it a name meaning "red rocks standing like men in a bowl-shaped canyon." From Rainbow Mountain, at the south end of the park, may be seen 30 miles of the Pink Cliffs with Bryce, Black Birch, Aqua, and other beautiful amphitheaters. (*See also* Cedar Breaks N. M., Zion N. M., and Zion N. P., in this article.) (C 4)*.

Cabrillo N. M., 1913, Point Loma, southern California, ½ acre. Juan Rodríguez Cabrillo, discoverer of California, first sighted its shore at this point Sept. 28, 1542. It commands a beautiful view of sea and wide curving coast line, bordered with hills and distant snowy mountains (A 5)*.

Canyon de Chelly N. M., 1931, northeastern Arizona, 83,840 acres. Prehistoric Indian cliff dwellings in Canyon de Chelly, Canyon del Muerto, and Monument Canyon. They record cultural progress covering a longer period than any other ruins in the Southwest. The beginnings and development of agriculture, pottery making, and food storage may be traced in the relics unearthed in the cavern floors. Remains of the Basket Makers underlie those of the later cliff-dweller and Pueblo periods. Along the canyon bottoms are the fields and summer hogans of the modern Navajo. (For picture, *see* Arizona; *see also* Cliff Dwellers; Pueblo Indians.) (C 4)*.

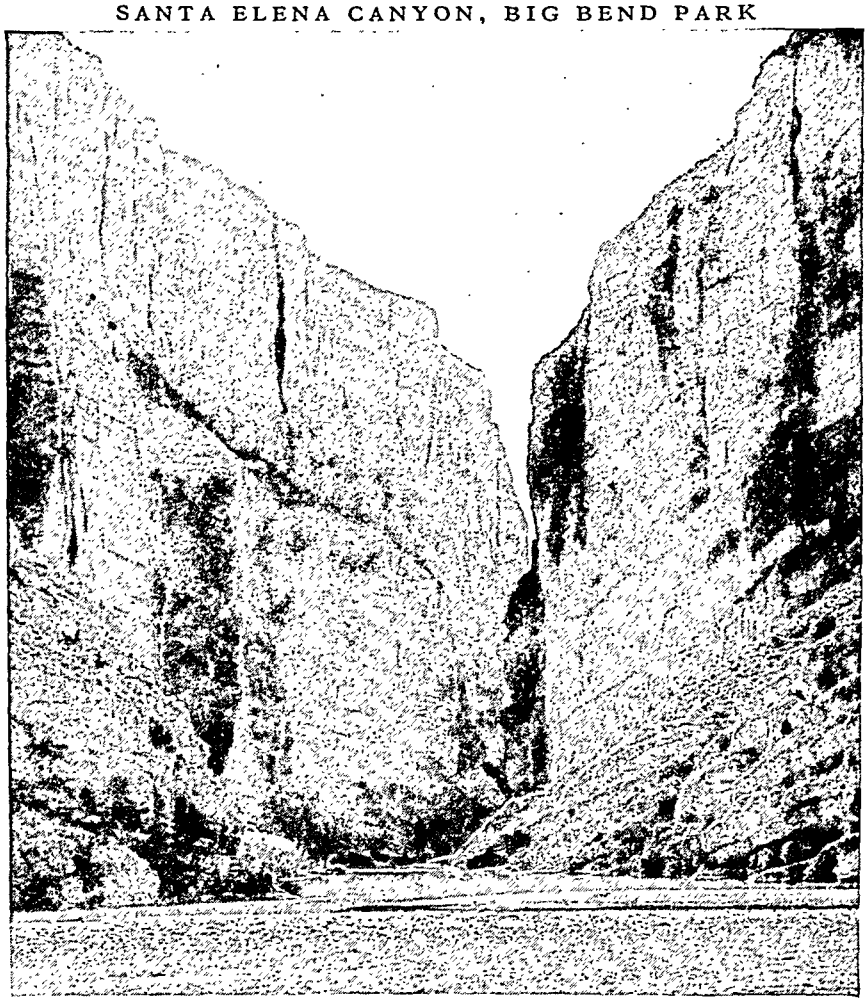
*Letters and numbers in parentheses give location on map on page 18.

Capitol Reef N. M., 1937, central Utah, 33,069 acres. A great ridge of rock 20 miles long, deeply gashed by canyons and fantastically eroded. It is part of a fault, or line of breakage, which occurred many millions of years ago when the horizontal rocks were forced upward 16,000 feet above sea level. The strata lie in relatively the same position they occupied before the uplift. Now they are exposed in the sheer face of the "reef," presenting a cross section of the geological history of the area. Petrified forests, extensive fossil deposits, cliff dwellings, and cliff paintings of prehistoric Indians attract scientists in many different fields (C4)*.

Capulin Mountain N. M., 1916, northeastern New Mexico, 680 acres. The steep-sided cinder cone of a recently extinct volcano. Its crater has a diameter of 1,500 feet and a depth of from 75 to 275 feet below the rim. A broad platform at the base was built up by successive flows of lava. The cone may be no more than a thousand years old (D4)*.

Carlsbad Caverns N. P., 1930, southeastern New Mexico, 45,847 acres. Under the Guadalupe Mountains is perhaps the largest underground labyrinth in the world. The length of the caverns is not yet known. Many miles of the underground chambers have been explored at levels of 750 feet, 900 feet, and 1,320 feet below the surface, but only a few miles are open to visitors.

SANTA ELENA CANYON, BIG BEND PARK



This is the mouth of Santa Elena Canyon, one of three deep canyons carved by the Rio Grande through the mountains. The cliff on the left is in Mexico; the one on the right is in Texas. The park embraces the "U turn" of the river southeast of El Paso.

Some of Carlsbad's great chambers are 300 feet high and thousands of feet long. Their walls are draped with pink-tinted curtains, hanging in folds so soft and graceful that it is difficult to realize they are stone. Frosty lacework adorns other walls. Jeweled fountains supported on pedestals and filled with turquoise-blue water are ornamented with onyx flowers. From the lofty ceilings hang thousands of glittering stalactites. The floors are a maze of stalagmites and flowstone in icy white, green, pink, purple, and tan. In one place the formations resemble a snow-banked forest; in another, a twisted tangle of thorn. There are giant totem poles, obelisks, towers, and domes elaborately carved. In hundreds of marble-lined pools may be found cave "pearls" —fragments of stone that have fallen into the pool, to be covered with layers of calcium carbonate, in much the same manner as the oyster builds up its pearl.

The limestone in which the caverns are hollowed was laid down in the sea many millions of years ago, according to the calculations of geologists. When the Guadalupe Mountains were later uplifted, the rock was cracked and broken. Rain water and underground streams flowing into and along the cracks slowly dissolved the rock. Long branching corridors appeared. As the walls and ceilings of the corridors collapsed, great rooms were formed. Water dripping into the chambers evaporated and deposited the minerals which it carried in solution. With infinite slowness, drop by drop, the spectacular curtains, pillars, lacework, and other formations were created. Their brilliance and translucence are due to the fact that they are saturated with water. Wherever water seepage stops, they become dull and powdery in appearance (*see also* Cave) (D6)*.

Casa Grande N. M., 1918, south central Arizona, 473 acres. A group of prehistoric Pueblo Indian ruins, of which the "Great House" is the largest. Its adobe walls, four feet thick at the base, are the remains of a three-story building which had a central tower four stories high. Of particular interest are the "calendar holes" in the east and center rooms. At sunrise on March 7 and October 7, and on no other days, a shaft of light strikes through the outer hole and within a quarter inch of the inner. Undoubtedly the light originally shot through both holes, but the walls have settled and thrown the inner hole out of alignment. The device probably enabled the people to determine the beginning of the spring and fall seasons.

The history of these Indians is largely conjectural. It is believed that they came as nomads to this desert plain in the Gila Valley and remained to build up a civilization based on agriculture. The ruins of their irrigation system are plainly visible. One canal was 20 miles long, 32 feet wide, and 7 feet deep. Some of the more primitive dwellings in the group may be 1,200 years old. The community was apparently abandoned between 1400 and 1450. The raids of warring

*Letters and numbers in parentheses give location on map on page 18.

tribes and exhaustion of the soil may have been the reason for the exodus. Father Eusebio Kino, in 1694, was the first white man to see and describe the ruins (C 5)*.

Castillo de San Marcos N. M., 1924, St. Augustine, Fla., 18.5 acres. The oldest existing masonry fort in the United States. The Spanish began its construction in 1672 to defend their Florida possessions. The fort is built of coquina (shell stone), with walls 12 feet thick. Like a medieval castle, it has a moat with a drawbridge and a portcullis. After the United States acquired Florida in 1819 it was named for Gen. Francis Marion. Osceola, the Seminole Indian chief, was imprisoned here. The Spanish name was restored in 1942. (For pictures, *see* St. Augustine; Florida.) (I 6)*.

Castle Clinton N. M., 1950, New York City, 1 acre. A fort built in 1808–11 and called the West Battery. Named Castle Clinton after the War of 1812 and still later called Castle Garden. From 1855 to 1890 the building was New York's immigrant receiving station; from 1896 to 1941 it was an aquarium. The aquarium was abandoned when Battery Park was torn up to build a tunnel to Brooklyn. It is planned to restore the original fort. Battery Park was reconstructed in 1952 (J 3)*.

Castle Pinckney N. M., 1924, Charleston, S. C., 3.5 acres. Part of the defenses of Charleston Harbor, built in 1810 to replace a Revolutionary War fort (I 5)*.

Cedar Breaks N. M., 1933, southwestern Utah, 6,172 acres. Like Bryce Canyon to the east, Cedar Breaks is a vast amphitheater cut into the Pink Cliffs. The cliffs are 2,000 feet high and mark the edge of the Markagunt Plateau. White or orange at the top, they shade into deep rose and coral, with splashes of dazzling white and sulfur yellow. As the sun and evening shadows play over them they become molten gold, orange, blue, and purple. The amphitheater is half a mile deep and two miles wide. From its rim on the plateau top one gazes down onto brilliantly colored and eroded rock. Beautiful forests cloak the rim (*see also* Bryce Canyon N. P., Zion N. M., Zion N. P., in this article) (B 4)*.

Chaco Canyon N. M., 1907, northwestern New Mexico, 21,353 acres. The highest development of Pueblo Indian civilization is represented in the 13 major ruins in and about Chaco Canyon. Pueblo Bonito (beautiful village) is the largest and most completely excavated ruin. It contained about 800 rooms and housed 1,200 or more persons. In the court are 32 *kivas*, or ceremonial chambers. A study of tree rings in the timbered ceilings shows that it was built in 919, with additions extending over a period of nearly 200 years. The University of New Mexico and the School of American Research maintain a research station here with full-time and summer courses. (*See* Pueblo Indians.) (C 5)*.

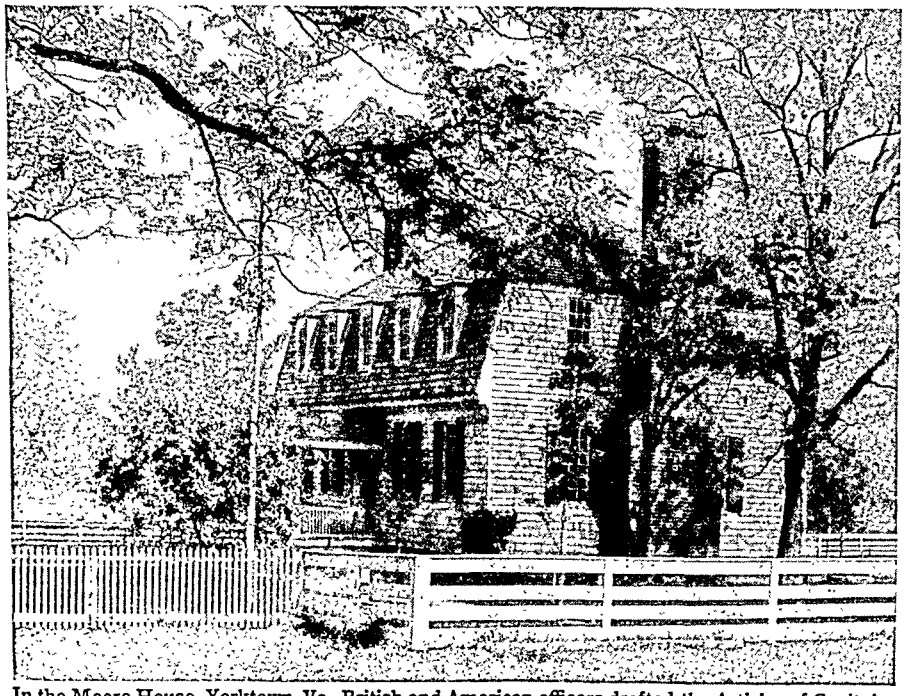
Chalmette N. H. P., 1939, Louisiana, 70 acres. Site of the battle of New Orleans, Jan. 8, 1815. An obelisk 110 feet high marks Andrew Jackson's position during the battle. (*See* Jackson, Andrew.) (G 6)*.

Channel Islands N. M., 1938, southern California, 26,819 acres (land area, 1,120 acres). Anacapa and Santa Barbara islands, set aside to preserve their fossils and their unique plant and animal life. A large rookery of sea lions flourishes today where once elephants lived and died. The islands are also examples of ancient volcanic eruption and active sea erosion (A 5)*.

Chiricahua N. M., 1924, southeastern Arizona, 10,481 acres. A region of volcanic rock, eroded into a maze of pillars and balanced rocks and formations resembling animals and faces. Steep-walled canyons, 200 feet deep, and narrow fissures separate many of the groups (C 5)*.

Colonial N. H. P., 1936, Virginia, 7,149 acres. The history and life of colonial Virginia, reconstructed in four areas—Jamestown, first permanent English settlement in North America; part of Yorktown, scene of the surrender of Cornwallis in the Revolutionary War, including several colonial homes; Cape Henry, where the colonists first touched Virginia soil; and a parkway between Jamestown, Williamsburg, and Yorktown (*see* Jamestown; Williamsburg; Yorktown) (I 4)*.

THE MOORE HOUSE, COLONIAL HISTORICAL PARK



In the Moore House, Yorktown, Va., British and American officers drafted the Articles of Capitulation, which covered the surrender of the British army, Oct. 19, 1781, ending the Revolutionary War.

Colorado N. M., 1911, west central Colorado, 18,121 acres. A magnificently eroded escarpment that rises a thousand feet above Grand Valley. Numerous canyons cut back for miles from its face into the Uncompahgre Uplands. Along the sheer front, hundreds of red sandstone towers stand out from the main ledges like gigantic sentinels, 400 and 500 feet high. A scenic highway, the Trail of the Serpent, winds from the base to the top of the escarpment. At Cold Shivers Point, on the brink of a 1,000-foot precipice, it overlooks Columbus Canyon. A continuation known as Rimrock Drive skirts Red, Ute, and Monument canyons (C 4)*.

*Letters and numbers in parentheses give location on map on page 18.

Crater Lake N. P., 1902, southwestern Oregon, 160,290 acres. Like a sapphire jewel, this exquisite lake lies in the crater of an extinct volcano in the Cascade Mountains. Sheer cliffs from 500 to 2,000 feet high encircle its waters. From the forested rim, one gazes into a circular bowl about six miles in diameter. Evergreens cling to the steep walls, their dense green accenting the soft tones of the lava rock and the brilliant blue of the lake. Near the west shore rises Wizard Island, a symmetrical cinder cone 763 feet high. Off the south shore lies the Phantom Ship, a twisted mass of lava resembling a ship under sail. The wonderful color is due to scattering of light by the water particles in a lake of exceptional depth and clearness.

The volcano in which Crater Lake lies was once a peak 14,000 or 16,000 feet high. Geologists call it Mount Mazama. The top of Mount Mazama collapsed and disappeared into the depths of the volcano. Unlike some volcanoes which blow their heads off and scatter the materials for miles around, this mountain literally swallowed itself. The crater, known to geologists as a *caldera,* is the only one of its kind in the United States proper (A 2)*.

Craters of the Moon N. M., 1924, central Idaho, 48,004 acres. Comparatively recent volcanic activity has left a lava plateau, cinder cones, spatter cones formed by lava bubbling from vents, and broken crater walls (the Devil's Orchard). The scene supposedly resembles the surface of the moon (C 3)*.

Cumberland Gap N. H. P. Project, 1940, Kentucky, Tennessee, and Virginia, 20,000 acres. The historic pass through the Appalachian Mountains traveled by Daniel Boone and other pioneers. The park will extend for about 20 miles along the crest of Cumberland Mountain. It will include portions of the ancient trail known as the Warriors Path, and the Wilderness Road at or near Cumberland Gap, Tenn., and Middlesboro, Ky. (For picture, *see* Kentucky; *see also* Boone; Roads and Streets.) (H 4)*.

Custer Battlefield N. M., 1946, Montana, 765 acres. Site of massacre of Gen. George A. Custer and American soldiers by Sioux Indians in 1876 (*see* Custer) (D 2)*.

Death Valley N. M., 1933, southern California-Nevada, 1,864,898 acres. A vast desert solitude hemmed in by brilliantly colored mountains (*see* Death Valley) (B 4)*.

Devils Postpile N. M., 1911, east central California, 798 acres. A sheer wall of basaltic columns packed together like a pile of posts. As hot lava cooled, it contracted and separated into these columns of four, five, six, and seven sides, with diameters of one to two feet. Glaciers subsequently moved over the area, exposed the columns, and polished their surfaces. From the top, the Devils Postpile looks like a black mosaic or a tile-inlay flooring. The combination of basaltic columns with glacial polish is found nowhere else in the world so far as geologists know (A 4)*.

Devils Tower N. M., 1906, northeastern Wyoming, 1,194 acres. A fluted column of volcanic rock, resembling a giant petrified tree stump. It rises 1,200 feet above the Belle Fourche River and 865 feet above the ridge that forms its base. The tower was created when molten lava forced its way upward into layers of sedimentary rock. The horizontal strata arched over the volcanic intrusion, forming a dome called a *laccolith.* Erosion has completely removed the covering of comparatively soft rock, and the much harder core of the dome stands out as a great pillar. Four other laccoliths in the vicinity are only partially uncovered, appearing like low hills. The columnar structure is due to contraction and cracking as the molten lava cooled. Devils Tower was a landmark of the pioneers in their overland journey to the West. In some directions it is visible for a hundred miles. This was the first national monument. (For picture, *see* Wyoming.) (D 2)*.

Dinosaur N. M., 1915, Utah and Colorado, 190,962 acres. The largest known deposit of fossilized dinosaur bones. Thousands of bones and many complete skeletons have been removed and sent to museums. One of the most remarkable finds was a complete skeleton of a brontosaurus, 100 feet long and 20 feet tall. Scientists believe that the bones were washed downstream by flood waters from some unknown source, to become embedded in a sand bar. The sea encroached upon this area. Mud and sand were deposited to a great depth. Then came a long period of uplift, and the sea retreated. The sediments became rock and were forced into mountains and high plateaus. Ages later, erosion of the rock exposed the fossilized bones. (*See* Reptiles; Prehistoric Life.) (C 3)*.

Effigy Mounds N. M., 1949, Iowa, 1,204 acres. Indian burial mounds in the form of birds and animals on bluffs overlooking the Mississippi River. They were carved like cameos, 2½ to 4 feet high, from the surface of the ground. The bird mounds are 70 to 120 feet across; the bear mounds, 85 to 115 feet long. They date from A.D. 700 to 1300 (F 3)*.

El Morro N. M., 1906, west central New Mexico, 881 acres. A mesa, or tablelike rock, rising 200 feet above the surrounding country, carved by erosion to resemble a castle or fortress (Spanish *morro*). For nearly 170 years El Morro was a refuge and camping place for the Spanish conquerors of the American Southwest. A cave on its south side, with a spring of cool water, could shelter a company of soldiers. The Spaniards carved the sides of the mesa with records of their journeys. The oldest inscription was made by Juan de Oñate on April 16, 1605. The last is dated 1774. Indian petroglyphs high on the cliff walls antedate the Spanish writings by hundreds of years. On the mesa top are the ruins of a prehistoric Indian pueblo (C 5)*.

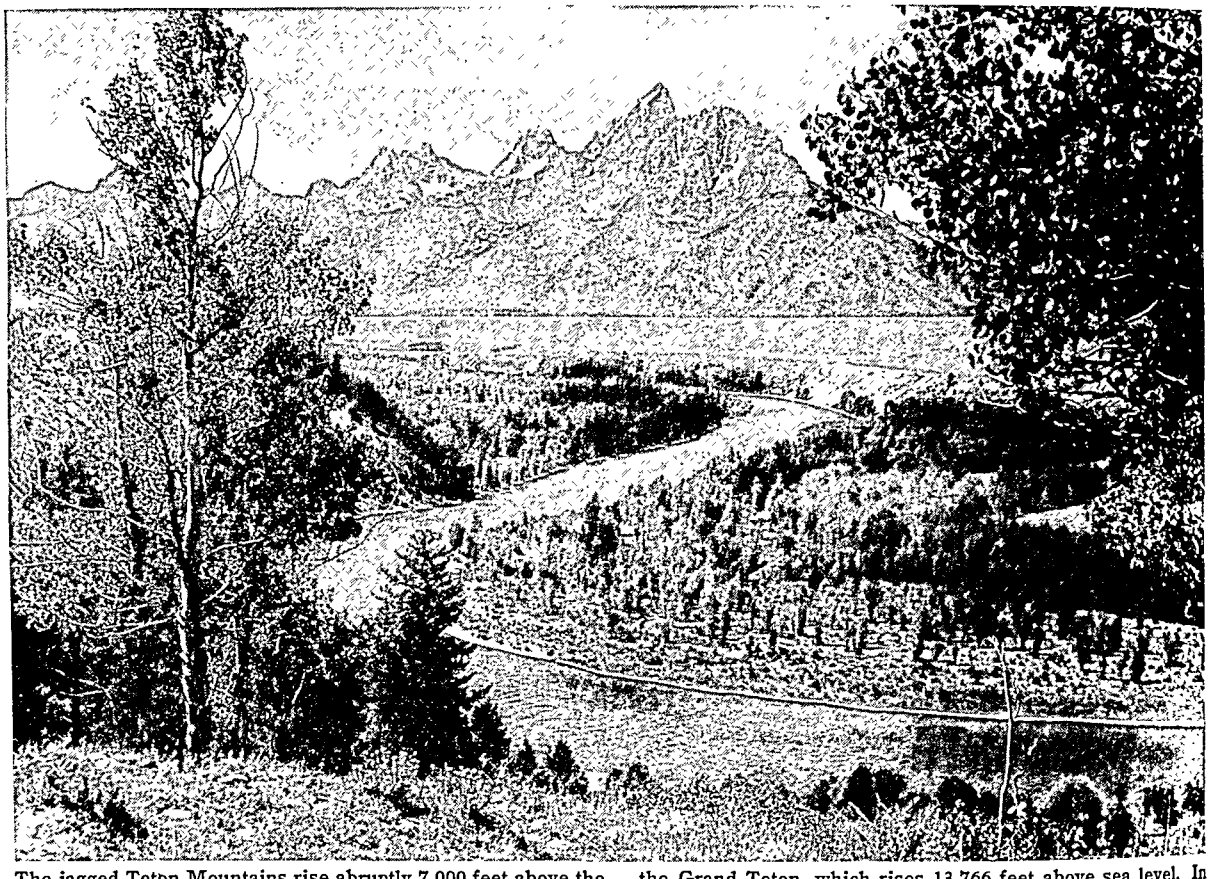
Everglades N. P., 1947, southern Florida, 1,258,361 acres. The only tropical area in continental United States, notable for its mangrove and cypress swamps, orchids, marsh animals, and rare birds. As the name implies, the "ever glades" are almost endless grassy stretches. The Seminole Indians called them "grass water." Dense jungle islands of tropical trees and vines, or "hammocks," break the vast watery wilderness. (*See* Florida; Everglades.) (I 7)*.

Fort Frederica N. M., 1945, Brunswick, Ga., 94 acres. Ruins of the fort built (1736–48) by James Oglethorpe as a defense against the Spanish (I 6)*.

Fort Jefferson N. M., 1935, 65 miles southwest of the mainland of Florida, 47,125 acres. A grim fort on Garden Key, one of the coral islands of the Dry Tortugas group. It was built in 1846 to control the Gulf of Mexico and Florida Strait. The huge structure was a military mistake, and no troops were stationed in it until the Civil War. In 1863 it became a military prison. Dr. Samuel A. Mudd, who set the broken leg of John Wilkes Booth, was imprisoned here as a conspirator in the assassination of Abraham Lincoln. His heroic services to the sick and dying in a yellow-fever epidemic won his pardon in 1869. The fort was abandoned in 1873 but was temporarily occupied during the Spanish-American War. The surrounding islands are a national bird and turtle refuge. (For picture, *see* Key West.) (I 7)*.

*Letters and numbers in parentheses give location on map on page 18.

THE TETON RANGE AND THE SNAKE RIVER



The jagged Teton Mountains rise abruptly 7,000 feet above the level floor of Jackson Hole. The highest peak in this scene is the Grand Teton, which rises 13,766 feet above sea level. In the foreground, the Snake River twists across Jackson Hole.

Fort Laramie N. M., 1938, southeastern Wyoming, 214 acres. From 1834 to 1890 Fort Laramie was associated with western exploration and settlement. Thousands of emigrants on the Oregon Trail stopped here at the junction of the Laramie and North Platte rivers to rest and replenish their supplies. The Pony Express riders paused to change horses. Stagecoaches came in with mail and passengers. Friendly Indians camped outside the stockade, wandering at will through the enclosure. Such famous scouts as Kit Carson, Jim Bridger, and Buffalo Bill enjoyed its hospitality. Other famous visitors were Francis Parkman, the historian, and Capt. Benjamin Bonneville and Gen. John C. Frémont, soldiers and explorers. The fort was established as a fur-trading post in 1834. The federal government purchased it in 1849, and for 40 years it was the only representative of law and order in a vast Indian country. Uprisings were quelled by its soldiers, and several Indian treaties were signed here. (For picture, *see* Oregon Trail.) (D 3)*.

Fort McHenry National Monument and Historic Shrine, 1939, Maryland, 43 acres. A fort built on a peninsula in Baltimore harbor in 1799. Its bombardment by the British fleet Sept. 13, 1814, inspired Francis Scott Key to write the poem 'The Star Spangled Banner' (*see* National Songs; Key; Maryland; Baltimore) (I 3)*.

Fort Matanzas N. M., 1924, Florida, 228 acres. A fort erected by the Spanish in 1737 on an island in the Matanzas River. It takes its name, a Spanish word meaning "slaughters," from an incident in the vicinity when the Spanish under Menéndez killed 300 French Huguenots in 1565 (I6)*.

Fort Pulaski N. M., 1924, Georgia, 5,362 acres. A fort on Cockspur Island in the mouth of the Savannah River, built from 1829 to 1847. During the Civil War it was bombarded and seized by Union forces. It is one of the best preserved of the chain of brick forts erected for coast defense by the United States during the early 19th century (I5)*.

Fort Sumter N. M., 1948, Charleston, S. C., 2 acres. Fort in Charleston harbor, scene of first Civil War battle (*see* Fort Sumter; Charleston, S. C.) (I 5)*.

Fort Vancouver N. M. Project, 1948, Vancouver, Wash., 65 acres. Site of fort established in 1825 by Hudson's Bay Company fur traders (A2)*.

Fossil Cycad N. M., 1922, southwestern South Dakota, 320 acres. Large deposits of fossil plants, called flowering cycads. These were tree ferns which flourished during the age of dinosaurs. Many of the trunks bear fossilized fruits and flower buds. The area is of interest only to scientists, as the deposits are underground. A number of specimens may be seen in the museum at Wind Cave National Park (D3)*.

George Washington Birthplace N. M., 1930, Virginia, 394 acres. A memorial mansion on the site of George Washington's birthplace, known as Wakefield. It stands on Popes Creek. A mile distant, on Bridges Creek, is the family burial ground and the site of an earlier ancestral home. Although no authentic picture of Wakefield has ever been discovered, enough of the foundations remained to indicate its size and character. It is a typical Virginia plantation house of the 18th century, surrounded by beautiful lawns and gardens. The boxwood

*Letters and numbers in parentheses give location on map on page 18.

hedges, transplanted from the nearby home of Sarah Tayloe Washington, are more than a hundred years old. The bricks of the house, like those of the original, were handmade. (For picture, *see* Washington, George.) (I 4)*.

George Washington Carver N. M., 1951, Missouri, 210 acres. Negro scientist's birthplace (*see* Carver) (F4)*.

Gila Cliff Dwellings N. M., 1907, southwestern New Mexico, 160 acres. Ruins of prehistoric Indian dwellings built into natural cavities in the face of a cliff 150 feet high. (*See* Cliff Dwellers.) (C 5)*.

Glacier N. P., 1910, northwestern Montana, 999,015 acres. Splendid mountains, in whose hollows lie 60 glaciers and 250 forest-rimmed lakes. Going-to-the-Sun Highway is one of the outstanding scenic roads of the world. It crosses the Continental Divide through Logan Pass at an altitude of 6,654 feet. Tunnels bore through overhanging cliffs. In the west tunnel two great windows permit grand views (*see* Glacier National Park) (C 1)*.

Glacier Bay N. M., 1925, Alaska, 2,297,734 acres. Tidewater glaciers in a lonely setting of magnificent mountain peaks. The Ecological Society of America and the National Geographic Society urged creation of the monument as a unique field for the scientific study of North America's Ice Age. The bay contains at least 11 glaciers, one of which, Muir Glacier, has a surface area of 350 square miles (B 7)*.

Grand Canyon N. M., 1932, north-western Arizona, 196,051 acres. Adjoining the Grand Canyon National Park on the western, or downstream, side, this monument preserves a stretch of the magnificent canyon. At Toroweap Point the canyon is 3,000 feet deep and four miles wide. From this point may be seen a giant cinder cone of volcanic origin known as "Vulcan's Throne" (B 4)*.

Grand Canyon N. P., 1919, north central Arizona, 645,296 acres. Perhaps the most awe-inspiring of the earth's spectacles, an immense canyon carved by the Colorado River (*see* Grand Canyon; Colorado River) (C 4)*.

Grand Teton N. P., 1929, northwestern Wyoming, 299,580 acres. A range of granite peaks, springing a sheer 7,000 feet above the level floor of Jackson Hole. Their grandeur is greatly enhanced by the absence of foothills. Many peaks rise more than 10,000 feet high. The loftiest peak is the Grand Teton, 13,766 feet high.

The range is an impenetrable barrier 40 miles long, extending southward almost from the southern boundary of Yellowstone National Park to Teton Pass, where it meets the Snake River Range. It is a block mountain which was tilted upward along a fault line, or line of fracture, in the earth's crust, until its eastern margin stood 10,000 feet high. Subsequent erosion wore away the sedimentary rocks on the face of the block, exposing its crystalline core. Viewed from Jackson Hole, this eastern face is a precipitous granite wall. On the western side, in Idaho, the unimpressive back of the block slopes gently, still overlaid with sedimentary and volcanic rocks.

The national park includes a 27-mile front on the Wyoming side. Small glaciers still linger in the deeper recesses of the range. Exquisite lakes, surrounded by evergreen forests, are strung in a crystal chain along the base of the mountains. Each lake lies at the mouth of a canyon carved by glaciers and is walled in by glacial moraines. In 1950 most of the Jackson Hole N. M., including Jackson Lake, was incorporated into this park. The remaining acreage was turned over to the Forest Service and to the National Elk Refuge (C3)*.

Gran Quivira N. M., 1909, central New Mexico, 451 acres. Site of a Spanish mission built by the Franciscans in the 17th century. The ruins include two mission buildings and 18 Pueblo Indian house mounds (D 5)*.

Great Sand Dunes N. M., 1932, south central Colorado, 35,522 acres. Wind-blown shifting mounds of sand in the San Luis Valley at the foot of the Sangre de Cristo Mountains. Rising in places to nearly a thousand feet, they are among the largest in the world. The winds drive the sands across the valley into a hook in the mountains, where they pile up in hills of glistening white. The presence of the sand on the margin of a fertile plateau has never been satisfactorily explained (D 4)*.

Great Smoky Mountains N. P., 1930, North Carolina and Tennessee, 507,159 acres. The loftiest mountains east of the Black Hills of South Dakota (*see* Great Smoky Mountains National Park; Appalachian Highlands) (H 5)*.

Harpers Ferry N. M. Project, 1944, West Virginia. Site of John Brown's raid and other historic events (*see* Harpers Ferry) (I3)*.

Hawaii N. P., 1916, Territory of Hawaii, 176,951 acres. Two active volcanoes, Kilauea and Mauna Loa, on the island of Hawaii, and the dormant volcano Haleakala on the island of Maui. The vast fire pit of Kilauea, 4,000 feet above the sea, is the most spectacular and accessible part of the park. It may be viewed from the Volcano House on its rim. In the Kilauea area is an oasis of about 100 acres which has escaped the encircling lava flows. About 40 species of tropical trees flourish in this natural park and it harbors many rare birds.

The crater of Mauna Loa, 13,680 feet above the Pacific Ocean, may be reached by trail from Kilauea, a three-day journey. Rest houses have been built along the way.

Haleakala, on Maui, is 10,025 feet high. It was once much higher, but its dome has collapsed, forming a great crater about 20 miles in circumference. Its floor, 3,000 feet below the rim, is covered with red, black, and orange cinder cones hundreds of feet high. There are about 30 miles of trails within the crater. A paved automobile highway to the crater rim extends up the eastern slope of the volcano through a dense rain forest and fern jungle. (*See* Hawaiian Islands.) (D 7)*.

Homestead National Monument of America, 1939, southeastern Nebraska, 163 acres. The first homestead in the United States, entered by Daniel Freeman under the General Homestead Act of 1862, which opened the West to free settlement (F4)*.

Hot Springs N. P., 1921, central Arkansas, 1,019 acres. Hot mineral springs, 47 in number, of medicinal value, and government-regulated bathhouses, in the city of Hot Springs. The springs have been under federal control since 1832 (*see also* Arkansas) (F5)*.

Hovenweep N. M., 1923, southern Utah and Colorado, 491 acres. Four groups of prehistoric towers, pueblos, and cliff dwellings in the remote canyons and high on the cliffs and plateau. They have been unoccupied for at least 600 years. The towers have been variously explained as temples, forts, or storage bins. Some were built on the edges of cliffs where they might have served as lookout towers. Still others were built directly over *kivas*, or underground ceremonial chambers. The name of the monument means "deserted valley." (*See* Cliff Dwellers.) (C 4)*.

Independence N. H. P. Project, 1948, Philadelphia, Pa., approximate proposed area, 25 acres. Historic buildings associated with the American Revolution and the founding and growth of the nation. The project includes about four city blocks bounded generally by Walnut, Chestnut, Sixth, and Second streets, but ex-

*Letters and numbers in parentheses give location on map on page 18.

cluding the new United States customhouse; and a memorial mall extending from the south side of Walnut Street to the north side of Race. In the project are the Independence Hall group of buildings, Philosophical Hall, site of Library Hall, Second Bank of the United States, Dilworth-Todd-Moylan House, Bishop White House, site of City Tavern, Philadelphia (Merchants') Exchange, First Bank of the United States, Carpenters' Hall, Franklin Court (site of Franklin's House), Christ Church and Cemetery, Gloria Dei (Old Swedes') Church, and the Deshler-Morris House in nearby Germantown. (*See* Declaration of Independence; Philadelphia.) (J 3)*.

Isle Royale N. P., 1940, western Lake Superior, 133,839 acres. An island wilderness, 50 miles northwest of the Keweenaw Peninsula of Michigan. It is the largest island in Lake Superior, about 45 miles long and nine miles wide. The shore line is steep and rocky, its cliffs broken by narrow coves and deep harbors. Rock ridges, from 300 to 800 feet high stripe the island from north to south. In the valleys between lie many lakes. Beautiful evergreen and hardwood forests harbor one of the largest moose herds in North America. There are no roads. The copper of Isle Royale was prized by the prehistoric Indians. Ancient mines may be seen (G 2)*.

Jackson Hole N. M. *See* Grand Teton N. P.

Jewel Cave N. M., 1908, southwestern South Dakota, 1,275 acres. Underground chambers and galleries encrusted with beautiful calcite crystals (D 3)*.

Joshua Tree N. M., 1936, southern California, 475,303 acres. A desert area at the foot of the Little San Bernardino Mountains, set aside to save the rare Joshua Tree from extinction. *Yucca brevifolia* is the scientific name of this plant of the lily family. It attains a height of 10 to 30 feet. In the spring it bears greenish-white blossoms in clusters from 8 to 14 inches long (B 5)*.

Katmai N. M., 1918, Alaska, 2,697,590 acres. A spectacular area of dying volcanic activity, with magnificent lake and mountain scenery. It includes the Valley of Ten Thousand Smokes, created in 1912 by a violent eruption of Mount Katmai which blew millions of holes through the floor of the valley at its feet. From the holes, or fumaroles, columns of steam rise from 500 to 1,000 feet, merging above in a vast cloud. Brilliantly colored muds surround the fumaroles. The explosion blew off the top of Mount Katmai, leaving a crater 3,700 feet deep and 8.4 miles in circumference. (*See* Alaska.) (A 7)*.

Kings Canyon N. P., 1940, east central California, 453,065 acres. A glorious wilderness in the Sierra Nevada, between Sequoia and Yosemite national parks. Along the crestline of the park 40 peaks tower to heights greater than 11,000 feet; and ten are more than 14,000 feet. West of this snowy rampart, on the lower shoulders of the range, are glacier-carved valleys that rival Yosemite in the height of their granite walls. Lovely flower-strewn meadows, hundreds of lakes, the headwaters of countless rushing streams, two great canyons cut by the Kings River, and magnificent forests make this one of the most beautiful of all the parks.

The former General Grant National Park, with its two groves of bigtrees (*Sequoia gigantea*), is now a part of the park. The General Grant Tree is 267 feet high and 40.3 feet in diameter. The 10,000-acre Redwood Mountain and Redwood Canyon section of the park contains the largest stand of sequoias in existence (*see* Sequoia (A 4)*.

Lassen Volcanic N. P., 1916, northern California, 103,809 acres. The only active volcano in the United States proper (*see* Volcanoes). Its snowy cone, 10,453 feet above sea level, stands near the southern end of the Cascade Mountains. In the vicinity are many other peaks and cinder cones from 7,000 to 8,000 feet high, lava fields, hot springs, fumaroles, or gas vents, boiling lakes, and other evidences of volcanic activity. After a quiescent period of about 200 years, Lassen erupted several times between 1914 and 1921. From its summit a magnificent panorama unfolds. To the west and southwest spreads the Sacramento Valley; to the north looms Mount Shasta; eastward are the Honey Lake Valley and the distant mountains of Nevada; and southward rise the forested slopes of the Sierra Nevada (A 3)*.

Lava Beds N. M., 1925, northern California, 46,162 acres. Volcanic activity extending over a long period and as recent as 500 years ago has covered this region with lava and cindery pumice (*see* Lava). Flows that look like thick frothy molasses turned to stone are honeycombed with tunnels and caves through which the molten material once flowed. They range from a few feet to several miles in length and from 10 to 75 feet in height. Where the tunnel roofs have collapsed are serpentine trenches, in places 100 feet deep and 250 feet wide. Flowers bloom in profusion wherever there is sufficient soil. During the Modoc Indian War of 1872–73, the Modocs established themselves in a natural lava fortress within the present monument boundaries, where they resisted United States troops for five months (A 3)*.

Lehman Caves N. M., 1922, east central Nevada, 640 acres. Large limestone caves with many stalactites (B 4)*.

Mammoth Cave N. P., 1936, Kentucky, 50,696 acres. Large caves in the beautiful wooded hill country of southern Kentucky, on the Green River. The ghostly underground lakes and streams and the vast chambers with their massive stalactites and stalagmites attract thousands of visitors. More than 150 miles have been explored since the historic Mammoth Cave was discovered in 1799, and new sections are still being opened.

The eight-mile trip through the cave includes such features as the saltpeter vats where gunpowder was made during the War of 1812; the Bottomless Pit; Dead Sea; Echo River; Valley of Flowers; Crystal Lake; and the Frozen Niagara, a cascade of glittering white onyx.

In 1938 four guides, in search of eyeless fish on the Roaring River, observed a narrow passageway partially blocked by a large rock. Their curiosity aroused, they burrowed their way into the depths of the earth for many hours. On the second day they came upon a series of large avenues and rooms whose beautiful formations excel anything in other portions of the cave. Two rooms are covered with exquisite gypsum flowers. Another room they named the Candy Kitchen for its colored and striped formations, resembling peppermint stick, taffy, and pink honeycomb (*see also* Cave) (H 4)*.

Meriwether Lewis N. M., 1925, central Tennessee, 300 acres. The burial place of Meriwether Lewis, explorer, and governor of Louisiana Territory. It is near the site of Grinder's Inn on the Natchez Trace, where Captain Lewis was found shot dead in 1809 (*see* Lewis and Clark Expedition) (G 5)*.

Mesa Verde N. P., 1906, southwestern Colorado, 51,018 acres. The largest and best-preserved prehistoric cliff dwellings and pueblos in North America. The green table (Spanish *mesa verde*) covered with cedar and piñon trees is 15 miles long and 8 miles wide. On three sides it rises abruptly from 500 to 800 feet above the neighboring valleys. Its south side is gashed with numerous steep-walled canyons which open into the canyon of the Mancos River. In the shelter of large caves eroded in

*Letters and numbers in parentheses give location on map on page 18.

the canyon walls and on the mesa top prehistoric Indians built at least 1,500 community apartment dwellings. The Cliff Palace alone must have housed at least 400 persons in its 200 rooms.

Mesa Verde was occupied by Basket Makers from about the beginning of the Christian Era to 700. Traces of their earth lodges may still be seen. The more highly developed Pueblo Indians then came in and remained until almost 1300, when drought and failing crops forced them to abandon the region. The oldest house which can be definitely dated by means of tree rings in the roof timbers was built about 1066. On a promontory at the junction of Cliff and Fewkes canyons stands the Sun Temple, a place of worship possibly dedicated to the sun (*see* Basket Makers; Cliff Dwellers; Pueblo Indians) (C4)*.

Montezuma Castle N. M., 1906, central Arizona, 783 acres. A five-story cliff dwelling of adobe brick built into a natural cave in the face of a cliff, some 80 feet above its base. It is reached by a series of ladders. The site was abandoned long before the white man reached North America (C5)*.

Morristown N. H. P., 1933, New Jersey, 958 acres. A strategic point during the American Revolution. It was only 30 miles from British lines on Manhattan and Staten islands. Troops could be quickly dispatched from Morristown northward to West Point, key to the defense of the Hudson Valley and New England, and west and south to the Delaware River and Philadelphia. Throughout the war American troops were stationed here, and Washington spent more time at Morristown than at any other headquarters. The park includes three areas. The Ford House, built in 1774, was occupied by General and Mrs. Washington from December 1779 to June 1780. It has been restored and refurnished as a typical example of a prosperous colonial home. A museum stands on the grounds. Fort Nonsense, on a high ridge overlooking the surrounding country, was built in April 1777, as a refuge for the regiment detailed to guard military stores. At Jockey Hollow, three to four miles southwest of Morristown, the army encamped during the winter of 1779–80. Remains of the barracks and other camp buildings may still be seen. The Wick and Guerin houses in the Hollow have been restored as examples of colonial farmhouses (J3)*.

Mound City Group N. M., 1923, south central Ohio, 68 acres. Prehistoric Indian mounds, containing altars and human remains (*see also* Mound Builders) (H4)*.

A NATURE WALK IN YELLOWSTONE



Naturalists conduct daily walks in the national parks. They answer visitors' questions, point out flowers and birds, and explain the geological formations and other interesting features of the area.

Mount McKinley N. P., 1917, central Alaska, 1,939,319 acres. The highest mountain in North America, 20,269 feet above sea level. It rises 17,000 feet above timberline and for about two thirds of the way to the summit is snow-covered throughout the year. No other mountain peak in the world rises so high directly from its base. The north and west sides drop abruptly to a treeless plateau, 2,500 to 3,000 feet in altitude, covered with mosses and grasses. Down the south and east slopes flow enormous glaciers. The foothills and valleys are covered with dense forests of black spruce. Mount Foraker, 17,395 feet high, and many other peaks of the Alaska Range lie within the park boundaries. Caribou, moose, grizzly and brown bears, mountain sheep, and many smaller animals flourish in this wilderness, most of which is still unexplored. A modern hotel accommodates visitors (A7)*.

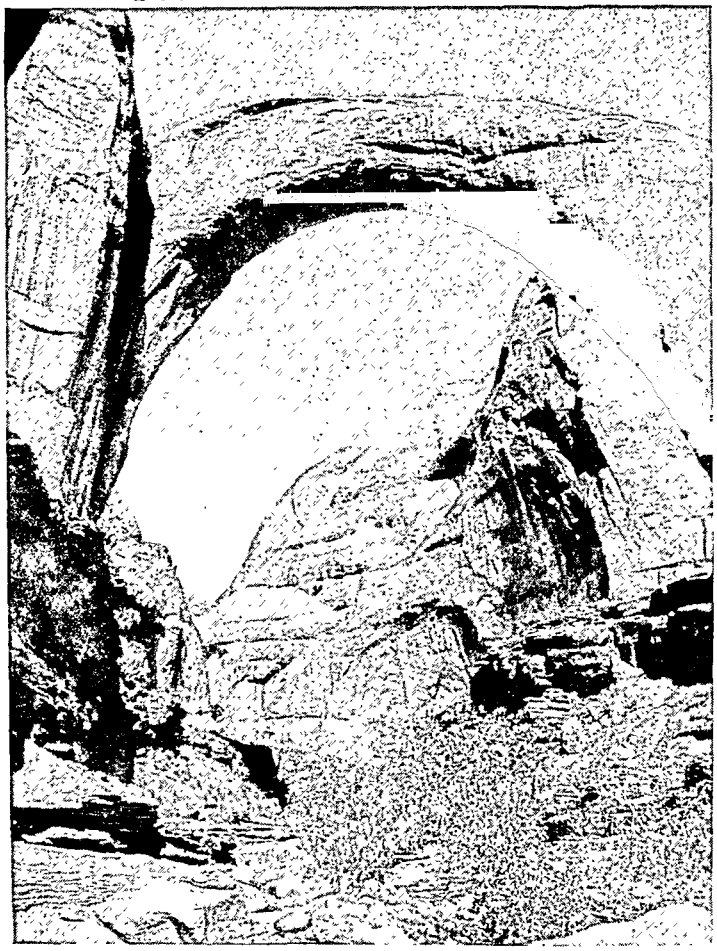
Mount Rainier N. P., 1899, west central Washington, 241,571 acres. An extinct volcano in the Cascade Range, with a snowy truncated cone 14,408 feet high. From the three-mile crater at its summit glaciers spread down the slopes in all directions like the icy tentacles of a giant octopus. Nisqually Glacier is the best known. Rivers flow from the melting ends of the glaciers; forests and flowery alpine meadows cover the lower slopes. John Muir thus described the flowers for which Mount Rainier is famous: "Above the forests there is a zone of the loveliest flowers . . . so closely planted and luxuriant that it seems as if nature, glad to make an open space between woods so dense and ice so deep, were economizing the precious ground and trying to see how many of her darlings she can get together in one mountain wreath—daisies, anemones, geraniums, columbine, erythroniums, larkspurs, among which we wade knee-deep and waist-deep, the bright corollas in myriads touching petal to petal. All together this is the richest subalpine garden I have ever found, a perfect floral elysium" (A1)*.

Muir Woods N. M., 1908, California, 485 acres. A grove of redwood trees at the foot of Mount Tamalpais, near San Francisco. It is named for John Muir, the naturalist and writer, who was an outstanding campaigner for national parks and forest reserves (A3)*.

Natural Bridges N. M., 1908, southeastern Utah, 2,650 acres. Three natural bridges of great size and beauty, near the head of White Canyon. The largest is the Augusta, or Sipapu, 222 feet above the stream, with a

*Letters and numbers in parentheses give location on map on page 18.

LONELY RAINBOW BRIDGE



In a wild and remote part of Utah, reached only by horseback, the beautiful Rainbow Bridge stands in lonely grandeur. Massive red cliffs tower 500 feet or more above the symmetrical curve of the bridge.

span 261 feet long and 65 feet thick at the top of the arch. The Caroline, or Kachina, Bridge and the Edwin, or Owachomo, Bridge are 205 feet and 108 feet high respectively. These bridges, like the great Rainbow Bridge not many miles distant, were formed by a meandering, or winding, river. Such a river wears away the inner side of the loops in its twisting course. Eventually it cuts through the neck of a loop and abandons the old course. In this region a hard capping layer of rock resists erosion while the softer layers beneath are washed away. The cap becomes a bridge beneath which the river pursues its new course. The inside of the old loop stands out as a mesa surrounded by canyons, which are the abandoned course. The bridge connects the mesa with the "mainland" of the plateau. In the vicinity are many ruins of cliff dwellings. (For picture, *see* Cliff Dwellers; *see also* Rainbow Bridge N. M., in this article) (C 4)*.

Navajo N. M., 1909, northeastern Arizona, 360 acres. Three cliff-dwelling ruins in caves high on the walls of Laguna and Nitsie canyons. They contained from 100 to 250 rooms each. Inscription House is so called from the words on one wall: "S-hapeiro Ano dom. 1661," probably written by a Spanish explorer or missionary. Tree rings in the ceiling beams indicate these dwellings were built between 1242 and 1286. (*See* Cliff Dwellers.) (C 4)*.

Ocmulgee N. M., 1936, Georgia, 683 acres. The monument is divided into two areas. The larger occupies a series of flat-topped bluffs encircling the meandering course of the Ocmulgee River. Here are seven prehistoric Indian mounds, an elaborate fortification system, a ceremonial earth lodge, an ancient trading post, and burial mounds. To the southeast, near the city of Macon, is a 40-acre tract known as the Lamar area. It is not yet fully developed. The mass of material excavated from the mounds shows several cultural levels. The primitive hunting state, the mound-building period, and the advanced culture of the Creeks are all represented. A trading post built between 1690 and 1715 by English traders has been uncovered (H 5)*.

Old Kasaan N. M., 1916, southeastern Alaska, 38 acres. An abandoned Haida Indian village on Prince of Wales Island. Totem poles, grave houses, monuments, and some of the original framework of the buildings are still standing. The Haida tribe migrated to Alaska from British Columbia. The descendants of the residents of Old Kasaan live at Kasaan village, 12 miles distant, near a salmon cannery which gives them employment (B 7)*.

Olympic N. P., 1938, northwestern Washington, 887,987 acres. The rain-swept, fog-drenched western slopes of the Olympic Mountains on the Olympic Peninsula and a 50-mile strip fronting the Pacific Ocean. Here is the finest remnant of primeval forest in the country. Huge evergreens lift their ancient crowns 300 feet high—Douglas firs, Sitka spruces, red cedars, and western hemlocks, some of them a thousand years old. At their feet a luxuriant jungle matting of ferns, mosses, and lichens envelops rocks and huge decaying logs. Swift rivers and streams slash through canyons across the forest tangle on their way to the sea. As the slopes rise from the warm, wet seacoast to the colder mountain heights they open into flowery alpine meadows studded with lakes. Above loom the snowy glacier-scored peaks dominated by Mount Olympus, 7,915 feet high. This area is the home of the rare Roosevelt elk, named for President Theodore Roosevelt, who established Mount Olympus National Monument in 1909. The monument became the nucleus of the park in 1909. The Olympic Ocean Strip skirting the Pacific coast was added in 1953 (A 1)*.

Oregon Caves N. M., 1909, Oregon, 480 acres. Miles of underground chambers in Siskiyou Mountains (A 2)*.

Organ Pipe Cactus N. M., 1937, south central Arizona, 328,162 acres. A sun-scorched, waterless desert on the Mexican border, famous for its rare organ pipe cactus, which grows only in this restricted area. The tubular arms of the plant, growing straight up for 20 or more feet resemble the pipes of an organ. Desert ironwood and many other unusual plants flourish here. Among its few living creatures are the Gaillard bighorn sheep and the Gila monster. Father Kino by 1700 had established a road across the desert, known as "El Camino del Diablo" (Devil's Highway). So great were the dangers and hardships of the road that hundreds of explorers, miners, and pioneers lost their lives along the way. It can be traced only intermittently today. The Indians of the Papago reservation have the privilege of harvesting the fruits of the organ pipe and other cacti (B 5)*.

Perry's Victory and International Peace Memorial N. M., 1936, Ohio, on Lake Erie, 14 acres. A granite

*Letters and numbers in parentheses give location on map on page 18.

shaft 352 feet high commemorating Oliver Hazard Perry's victory over the British fleet at Put-in-Bay, Sept. 10, 1813, and the century of peace ensuing between the two nations (H3)*.

Petrified Forest N. M., 1906, west central Arizona, 85,304 acres. Six forests of petrified wood, strewn with sections of tree trunks. There are no standing trees and but few instances of upright trunks and roots. One of the largest logs is the Agate Bridge, four feet in diameter and 100 feet long. It spans a gully 40 feet wide and 20 feet deep. Throughout the monument are ruins of prehistoric Indian dwellings. "Picture writings," or petroglyphs, are carved on the cliffs. Newspaper Rock is a large rock with many of these signs and symbols.

The monument also includes the most spectacular parts of the colorful Painted Desert. This is an area of brilliantly colored rocks, carved by erosion into a series of cliffs, isolated mesas, and deep canyons. It was discovered in 1540 by Coronado, who named it "El Pintado Desierto" (*see also* Petrified Forests) (C5)*.

Pinnacles N. M., 1908, west central California, 12,818 acres. Spirelike rock formations which rise 500 to 1,200 feet above the floors of several canyons, eroded in a volcanic ridge. Also of interest are numerous caves and a variety of volcanic features. The highest point, Chalone Peak, commands a superb view (A4)*.

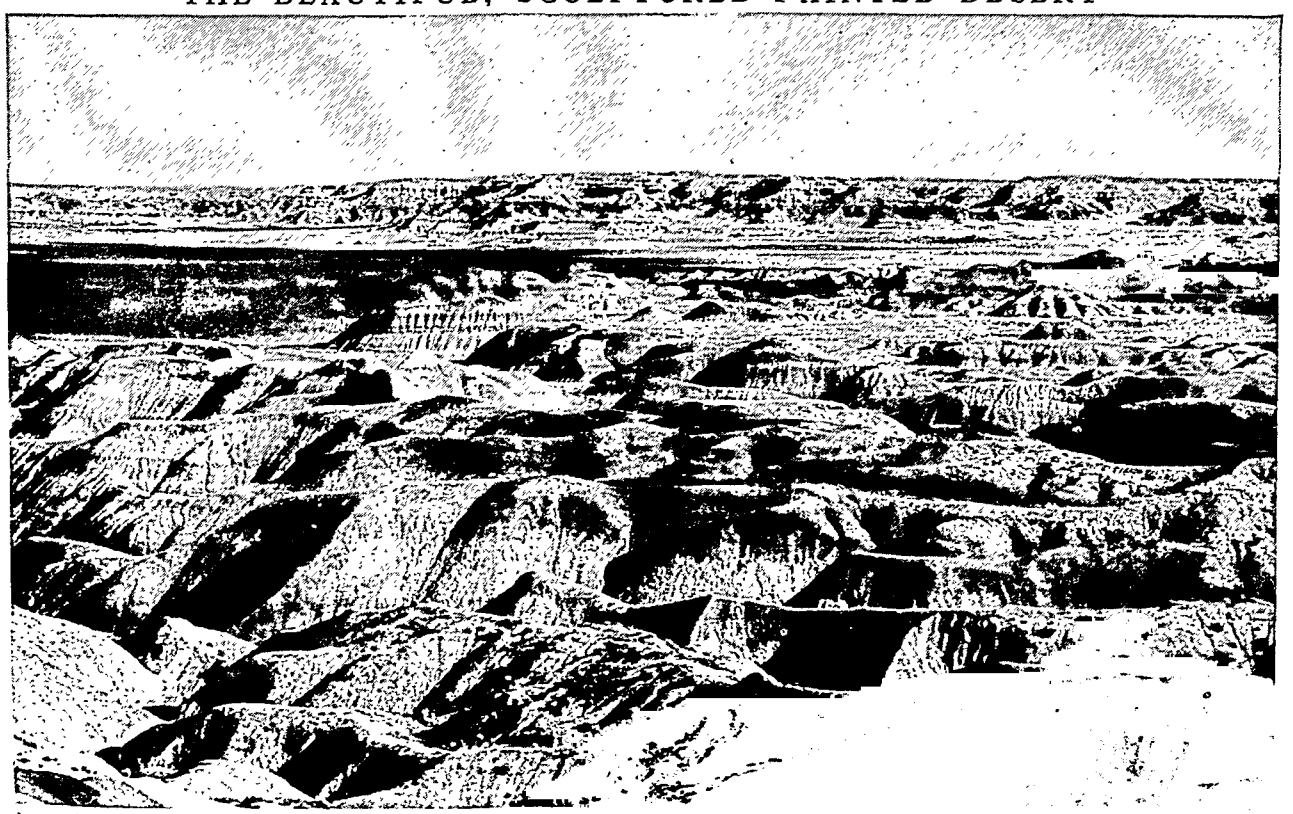
Pipe Spring N. M., 1923, northwestern Arizona, 40 acres. A spring of cold pure water famous in Utah and Arizona history. Brigham Young, president of the Mormon Church, in 1856 sent William Hamblin on a peace mission to the Hopi Indians of Arizona. With his party of ten, he camped by the spring. It received its name when Hamblin, in a contest of marksmanship, shot the bottom out of a pipe without breaking the bowl. The Mormons established a cattle ranch here and built a stone fort around the spring. The presence of a large spring in this desert country is due to a break, or fault, in the earth's crust. Underground waters draining from the higher plateaus to the north find their way to the surface through this crack. The first telegraph station in Arizona was in the fort, known as "Winsor Castle" (B4)*.

Pipestone N. M., 1937, southwestern Minnesota, 116 acres. Quarries of red stone from which the Indians of ancient and historic times made their peace pipes. Within the monument also are three granite boulders, known as the "Three Maidens," at which many ceremonials were held. The region was considered a sanctuary for all Indians of all tribes. Quarrying is reserved exclusively for the Indians (F3)*.

Platt N. P., 1906, southern Oklahoma, 912 acres. Sulfur and bromide springs of medicinal value in a picturesque region of wooded, gently rolling hills (F5)*.

Rainbow Bridge N. M., 1910, southeastern Utah, 160 acres. The largest known natural bridge in the world, not seen by white men until 1909. It lies in one of the wildest and most inaccessible regions in the United States. Even today it can be reached only on horseback, at least two days being required for the round trip. The bridge is a beautifully symmetrical arch of salmon-pink limestone, 309 feet high and 278 feet from pier to pier. It is unusual in having a curved top, like the arch of the rainbow. Fire-blackened stones indicate that prehistoric Indians worshiped here, and modern Indians regard it with religious awe (*see also* Natural Bridges N. M., in this article) (C4)*.

THE BEAUTIFUL, SCULPTURED PAINTED DESERT



A section of the Painted Desert is included in the Petrified Forest National Monument of eastern Arizona. It is a waste of brilliantly colored rocks, eroded into a wild confusion of cliffs, ridges, and domes. The rocks are white and yellow, gray, mauve, purple, pink, coral, and deep red. As sunshine and clouds play over them, the colors shift and glow as though they were alive.

*Letters and numbers in parentheses give location on map on page 18

BLACK BEARS IN YOSEMITE NATIONAL PARK



The national parks are wildlife sanctuaries. No hunting is permitted at any time, and the animals may not be disturbed. The bears are always interesting to visitors, for they come close to the hotels, camps, and highways to beg for food. They are dangerous wild animals, however, and people are warned not to approach them and never to attempt feeding them by hand.

Rocky Mountain N. P., 1915, north central Colorado, 254,736 acres. Part of the majestic Front Range of the Rocky Mountains. Within the park boundaries 65 peaks rise more than 10,000 feet above sea level, dominated by Longs Peak, 14,255 feet high. The east side drops down from the Continental Divide in sheer precipices from 2,000 to 3,000 feet deep. At the bottom of rock-bound gorges lie wild and lonely lakes. The gentler west side has flowery valleys, countless streams, and forest-rimmed lakes, flanked by the Never Summer Mountains. The east entrance to the park is the village of Estes Park. From here highways lead to the most scenic areas. Grand Lake is the western gateway. The Trail Ridge Road, across the Continental Divide, reaches a height of 12,183 feet. (*See* Rocky Mountains.) (D 3)*.

Saguaro N. M., 1933, Arizona, 54,972 acres. The giant saguaro cactus, preserved near Tucson in the Santa Catalina Mountains. Some of the plants are 50 feet high and about a hundred years old. (*See* Cactus.) (C 5)*.

Saint Croix Island N. M. Project, 1949, Maine, approximate area, 50 acres. An island in the Saint Croix River, boundary between Maine and New Brunswick, settled by the French in 1604 (J 1)*.

Saratoga N. H. P., 1948, New York, 2,208 acres. Site of General Burgoyne's surrender to General Gates on Oct. 17, 1777; regarded as the turning point in the American Revolution (*see* Saratoga Springs) (J 2)*.

Scotts Bluff N. M., 1919, western Nebraska, 2,196 acres. Famous landmark on the Oregon Trail. The bluff rises nearly 800 feet above the North Platte River. Through Roubidou Pass, and later through Mitchell Pass, labored the covered wagons on their way to the Pacific coast. The Pony Express, the first stage lines, and the first transcontinental telegraph company established stations here. (For picture, *see* Nebraska.) (D 3)*.

Sequoia N. P., 1890, east central California, 385,178 acres. Forests of bigtrees on the western slopes of the Sierra Nevada. One of the largest and oldest living things in the world is the General Sherman Tree, 272.4 feet high, 36.5 feet in diameter, and perhaps 4,000 years old (for picture, *see* California). Within the park are Mount Whitney, the highest peak in the United States proper (14,495 feet), and Kern Canyon, 3,000 feet deep and 25 miles long. Moro Rock (6,719 feet above sea level), in the Giant Forest area, affords a magnificent view of the Great Western Divide, Alta Peak, the San Joaquin Valley, and the distant Coast Range to the west. From the summit of Moro to its base is an almost sheer drop of 4,119 feet. Kings Canyon National Park adjoins Sequoia on the north (*see* Sequoia) (A 4)*.

Shenandoah N. P., 1935, northwestern Virginia, 193,473 acres. The crest of the Blue Ridge Mountains, extending about 75 miles from Front Royal on the north to Jarnam Gap, near Waynesboro, on the south. The park averages four miles in width. The area is characterized by a high ridge from 3,000 to 4,000 feet above sea level from which branch sharp spur ridges. Hawksbill Head, 4,049 feet, is the highest point. Between the ridges lie narrow valleys or coves, with rushing streams and waterfalls. Beautiful hardwood forests cover hill and valley. The park is most noted for the panoramic views from the Skyline Drive. Extending the length of the

*Letters and numbers in parentheses give location on map on page 18.

park, this drive is a part of the Blue Ridge Parkway between Shenandoah and Great Smoky Mountains national parks. To the east stretch the farmlands of the Piedmont Plain. On the west lies the Shenandoah Valley, from 20 to 25 miles wide, through which the Shenandoah River winds on its way north to join the Potomac. Massanutten Mountain, a group of long, low ridges, crosses the valley to the north, and in the distant west rise the Allegheny Mountains. (*See* Virginia.) (I 4)*.

Shoshone Cavern N. M., 1909, northwestern Wyoming, 212 acres. A cave near the summit of Cedar Mountain. Its walls are encrusted with crystals and drip formations, but there are no large stalactites or stalagmites. The descent by ladders is perilous and the monument has been closed to visitors (C 2)*.

Sitka N. M., 1910, southeastern Alaska, 53 acres. Site of an ancient village of warlike Indians. They were subdued here by the Russians in 1804. Sixteen totem poles collected from different points on Prince of Wales Island are objects of interest. (*See* Alaska.) (B 7)*.

Statue of Liberty N. M., 1924, New York City, 10 acres. A great statue of 'Liberty Enlightening the World', on Bedloe's Island (*see* Liberty, Statue of) (J 3)*.

Sunset Crater N. M., 1930, north central Arizona, 3,040 acres. An area of comparatively recent volcanic activity. Sunset Mountain is an extinct volcano rising 1,000 feet above the surrounding country. Its crater is rimmed with bright-yellow sulfur, shading down into bands of orange, red, and finally black volcanic ash, which give it the appearance of a sunset glow. The region is fantastically marked by lava flows hundreds of feet deep; fumaroles, or holes in the lava from which gases escaped; and cinder cones—all entirely without soil or vegetation. In the lava beds are numerous ice caves. Nearby are the lofty San Francisco Peaks, also extinct volcanoes (C 5)*.

Timpanogos Cave N. M., 1922, north central Utah, 250 acres. Three limestone caverns on the northern slope of Mount Timpanogos in the Wasatch Range. They are reached by a steep trail up the wall of American Fork Canyon. The caves were washed out by American Fork Creek along the lines of a fault, or breakage, in the mountain which occurred, geologists say, some 50 million years ago. After creating the caves the stream carved out the canyon which lies below (C 3)*.

Tonto N. M., 1907, south central Arizona, 1,120 acres. Two cliff dwellings built in the 14th century but showing signs of recent Indian occupancy. They are structures of adobe, two and three stories high, built into caves in the face of a cliff. The supporting beams, window frames, and low doors are still in place (C 5)*.

Tumacacori N. M., 1908, southern Arizona, 10 acres. The Spanish mission of San José de Tumacacori, founded by Father Eusebio Kino, Jesuit missionary, about 1690. It was taken over by the Franciscans in 1769. The date of the present building is uncertain. A small chapel stood on the site until 1730, when a new building was erected. This was attacked and destroyed by Apaches in 1769; repaired, and again damaged in 1800. Once more it was rebuilt and dedicated in 1822. Soon afterward it was abandoned, when the Franciscans were expelled from Mexico. The ruins consist of the walls and tower of the church building, the walls of a mortuary chamber, and a courtyard surrounded by adobe walls. Nearby is a modern museum building (C 6)*.

Tuzigoot N. M., 1939, Arizona, 43 acres. An ancient pueblo on a ridge above the Verde River, occupied from about 1000 to 1400 by three different cultural groups. They apparently lived here simultaneously. From the floors of the rooms and from hundreds of burials, scientists have recovered pottery; bone, horn, and stone implements; basketry; matting; and jewelry (B 5)*.

Verendrye N. M., 1917, northwestern North Dakota, 253 acres. The place on the bank of the upper Missouri River where François and Louis Joseph de la Vérendrye camped during their explorations in 1742. With their famous father, Pierre Gaultier de Varennes, Sieur de la Vérendrye, they were the first white men to explore the interior of the Northwest (E 2)*.

Walnut Canyon N. M., 1915, north central Arizona, 1,642 acres. About 300 cliff houses built under the sloping walls of Walnut Canyon. Unlike the communal type, these dwellings of from six to eight rooms each seem to have been intended for separate families. They were occupied from about 900 to 1100. Water was carried from the canyon bottom along trails which may still be traced. In the center of the canyon is an isolated butte apparently used as a fort. Observation Point offers a splendid view of the ruins (C 5)*.

White Sands N. M., 1933, south central New Mexico, 140,247 acres. Dazzling snow-white gypsum crystals, piled by the wind into huge dunes from 10 to 45 feet high, resemble snowdrifts. Gypsum in solution is washed down from the mountains onto alkali flats where the crystals are deposited by evaporation of the water. Some of them are derived from water pushing upward through underground beds of gypsum and evaporating at the surface.

Most of the area is without plant life, yet some plants have shown a remarkable ability to adapt themselves to their strange environment of shifting sands. Some of them have long stems of more than 40 feet. The animals that do exist here have also adapted themselves to their peculiar surroundings. Mice and lizards have white coats that blend with the white sands (D 5)*.

Whitman N. M., 1940, Washington, 46 acres. Site of an Indian mission and school, near Walla Walla; established in 1836 by Marcus Whitman and his wife (*see* Whitman, Marcus) (B 2)*.

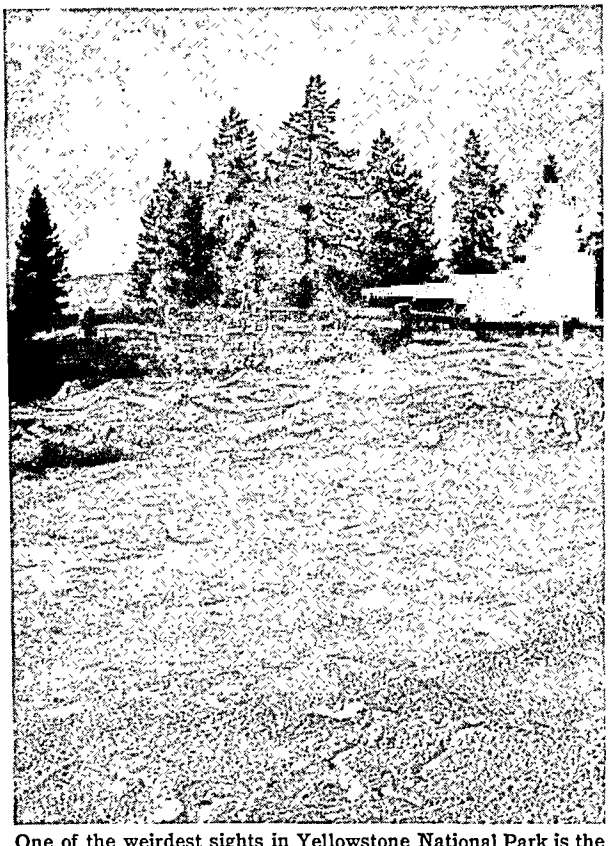
Wind Cave N. P., 1903, southwestern South Dakota, 27,886 acres. A large cavern in the Black Hills, notable for its unique boxwork or frostwork formations. The boxwork is composed of delicately colored crystals in honeycomb pattern, deposited by evaporating water along countless cracks in the cave walls and roofs. There are few stalactites or stalagmites. Strong currents of air blowing in or out of the cavern's mouth suggested its name. Changes in the atmospheric pressure outside cause the winds. A game preserve within the park harbors bison, antelope, elk, and deer (D 3)*.

Wupatki N. M., 1924, north central Arizona, 34,853 acres. Pueblo ruins overlooking the Painted Desert. They were occupied from the 11th to the 13th centuries by peoples who are believed to have been the ancestors of the modern Hopi Indians. (*See* Pueblo Indians.) (C 5)*.

Yellowstone N. P., 1872, northwestern Wyoming and parts of Montana and Idaho, 2,213,207 acres. A volcanic region famous for its geysers and hot springs, its boiling clay pools and steaming rivers. An exquisitely colored canyon with plunging waterfalls, the beautiful Yellowstone Lake, petrified forests, and matchless mountain scenery make it an area of the most varied interest. The best known of its attractions may be visited by automobile or bus over fine highways, but nine tenths of the park is a wilderness inaccessible even by trail. As late as 1940 a new area of hot springs was discovered (*see* Yellowstone National Park) (C 2)*.

*Letters and numbers in parentheses give location on map on page 18.

NATURE BOILS A BREW



One of the weirdest sights in Yellowstone National Park is the Fountain Paint Pot. It is a well of brightly colored boiling clay. Heated by volcanic activity, the clay bubbles like a stew.

Yosemite N. P., 1890, east central California, 757,617 acres. Yosemite Valley (*see* Yosemite National Park) is a small part of this spectacular wilderness in the Sierra Nevada. The beautiful Hetch Hetchy Valley, Tuolumne Canyon, Lee Vining Canyon, the groves of big trees (sequoias) and sugar pines, and the magnificent Tioga Pass Road over the mountains are all remarkable (A 4)*.

Yucca House N. M., 1919, southwestern Colorado, 10 acres. Ruins of a prehistoric Indian village, most of it still buried. Not open to the public (C 4)*.

Zion N. M., 1937, southwestern Utah, 33,921 acres. On the western border of Zion National Park; an area which contains the Kolob canyons. They have been cut by stream erosion into the face of the 3,000-foot Hurricane Cliffs. The red walls of the eight canyons are from 1,500 to 2,500 feet high. The region can be visited only on horseback (B 4)*.

Zion N. P., 1919, southwestern Utah, 94,241 acres. A beautiful canyon cut by the Virgin River into the Vermilion and White Cliffs, which stretch across the plateau country of southern Utah. It is entered between two great blocks of stone, the West Temple, 3,805 feet above the valley floor, and The Watchman, 2,713 feet high. Beyond the impressive gateway the visitor finds himself in a canyon, a mile wide from rim to rim and half a mile wide at the bottom, with steep walls half a mile high. The lower walls are mauve and purple shales. Against the east wall of the canyon stands the Great White Throne, a flat-topped dome towering 2,447 feet. In vivid contrast to the Throne is the dull red of the Angels Landing (1,425 feet) directly opposite. The automobile highway ends in a great parklike amphitheater, the Temple of Sinawava. Beyond, a trail leads to The Narrows, where the canyon is 2,000 feet high and only 50 feet wide. From the top of Lady Mountain, reached by a trail, one obtains a grand view of the valley and plateau. The Zion-Mount Carmel Highway crosses the southern part of the park. A Mormon scout discovered Zion Canyon in 1858. Mormon settlers grazed stock and farmed in it until 1909, when it was made a national monument (B 4)*.

*Letters and numbers in parentheses give location on map on page 18.

National Recreation Areas

The National Recreation Areas are:

Cape Hatteras N. Seashore R. A. Project, 1937, North Carolina, 30,000 acres. Beaches, waterfowl, fishing, and lighthouse on barrier reef (J 4)*.

Coulee Dam N. R. A., 1946, Washington, 98,500 acres; Franklin D. Roosevelt Lake, formed by Grand Coulee Dam on the Columbia (*see* Columbia River) (B 1)*.

Lake Mead N. R. A., 1936, Arizona and Nevada, 1,899,728 acres. Lake Mead, created by Hoover Dam, and Lake Mohave, by Davis Dam (*see* Colorado River) (B 4)*.

Millerton Lake N. R. A., 1945, California, 11,605 acres; a lake in the foothills of the Sierra Nevada, near Fresno, formed by Friant Dam, part of the Central Valley Project (A 4)*.

Shadow Mountain N. R. A., 1952, Colorado, 10,231 acres. Shadow Mountain Lake and Granby Reservoir of the Colorado-Big Thompson Project (D 4)*.

Other Areas in the National Park System

The National Park Service also administers the following national memorials: Coronado, near Bisbee, Ariz., commemorates the exploration of Coronado in the Southwest, 1540–42; De Soto, Bradenton, Fla., memorializes De Soto's landing in Tampa Bay in 1539; Fort Caroline, Jacksonville, Fla., site of a French Huguenot colony founded in 1564; House Where Lincoln Died, Lincoln Memorial, Lincoln Museum, Thomas Jefferson Memorial, and Washington Monument, all in Washington, D. C.; Kill Devil Hill, Kitty Hawk, N. C., where the Wright brothers made the first sustained flight by airplane; Lee Mansion in Arlington Cemetery, Va., home of Robert E. Lee; and Mount Rushmore, near Keystone, S. D., huge figures of four presidents carved in the stone face of Mount Rushmore.

The Theodore Roosevelt National Memorial Park is in west central North Dakota. Its 65,569 acres is split into two units—the Bad Lands along the Little Missouri River and part of Theodore Roosevelt's Elkhorn Ranch. (*See* North Dakota.)

National parkways are being developed along motor highways of unusual scenic and historic interest. Mount Vernon Memorial Highway follows the Potomac River, linking Washington, D. C., with Mount Vernon. It is part of the George Washington Memorial Parkway on the Maryland and Virginia shores of the Potomac. The Blue Ridge Parkway joins the Shenandoah and the Great Smoky Mountains national parks. Part of it is the Skyline Drive on the crest of the Blue Ridge Mountains through Shenandoah National Park. The Natchez Trace Parkway follows the old Indian trail between Natchez, Miss., and Nashville, Tenn. The Suitland Parkway connects Washington, D. C., with Andrews Air Base in Maryland.

National parkway projects are under way. The Baltimore-Washington Parkway will connect the two cities named. The Chesapeake and Ohio Canal Parkway will follow the old canal in Maryland. The Foothills Parkway will parallel the northern boundary of the Great Smoky Mountains National Park.

National Battlefield Sites administered by the National Park Service are Antietam, Md.; Tupelo and Brices Cross Roads, Miss.; Fort Necessity, Pa.; White Plains, N. Y.; and Cowpens, S. C. The first two commemorate Civil War battles; the rest, Revolutionary War battles. The Service also administers National Cemeteries (*see* National Cemeteries).

The National Military Parks embracing Civil War sites are Chickamauga and Chattanooga in Georgia and Tennessee; Gettysburg, Pa.; Vicksburg, Miss.; Fredericksburg and Spotsylvania County Battlefields Memorial, and Petersburg, Va.; Shiloh, Stones River, and Fort Donelson, Tenn. The military parks memorializing Revolutionary War battles are Moores Creek and Guilford Courthouse, N. C.; and Kings Mountain, S. C. Kennesaw Mountain, Ga., and the battlefield at Richmond, Va., are National Battlefield Parks embracing Civil War sites.

National Forests and Wilderness Areas

Besides the areas administered by the National Park Service, there are many other publicly owned areas in which the people of the United States may find recreation. National forests, which cover many times the combined areas of the national parks, were created by the United States government primarily to protect the nation's lumbering and grazing resources. Hunting is permitted in season in the forests but never in the parks. (*See* Forests and Forest Protection.)

Wilderness areas were first set aside in 1937 on Indian reservations and in the national forests. They are held for the government by the Forest Service and the Bureau of Indian Affairs. Each area contains at least 100,000 acres. In nonforested regions the areas must be at least 500,000 acres. There are no improvements, except the simplest trails. There are no roads, no hotels, no camps. In these romantic regions the traveler may enjoy the thrills and hardships of an exploring Coronado, the adventure and excitement of the gold seeker and fur trader. Here the life of pioneer America is re-created.

To provide experienced leadership for journeys into these last strongholds of nature, the American Forestry Association has formed the Trail Riders of the Wilderness. Each expedition of about 25 persons is accompanied by a physician, a forest ranger, and a botanist. Expert guides and cooks are hired. Expenses are shared on a nonprofit basis.

The Wilderness Society, with headquarters in Washington, D. C., is a national conservation organization whose purpose is to preserve wilderness areas and to carry on an educational program concerning their value and how they may best be used in the public interest. It is supported by membership dues and private contributions. The Society publishes a quarterly magazine, *The Living Wilderness*.

State and Local Parks

The National Park Service aids in the development of state, county, and municipal parks. The Civilian Conservation Corps co-operated from 1933 to 1943 by constructing buildings, cutting firebreaks and trails, and controlling erosion, plant diseases, and insects.

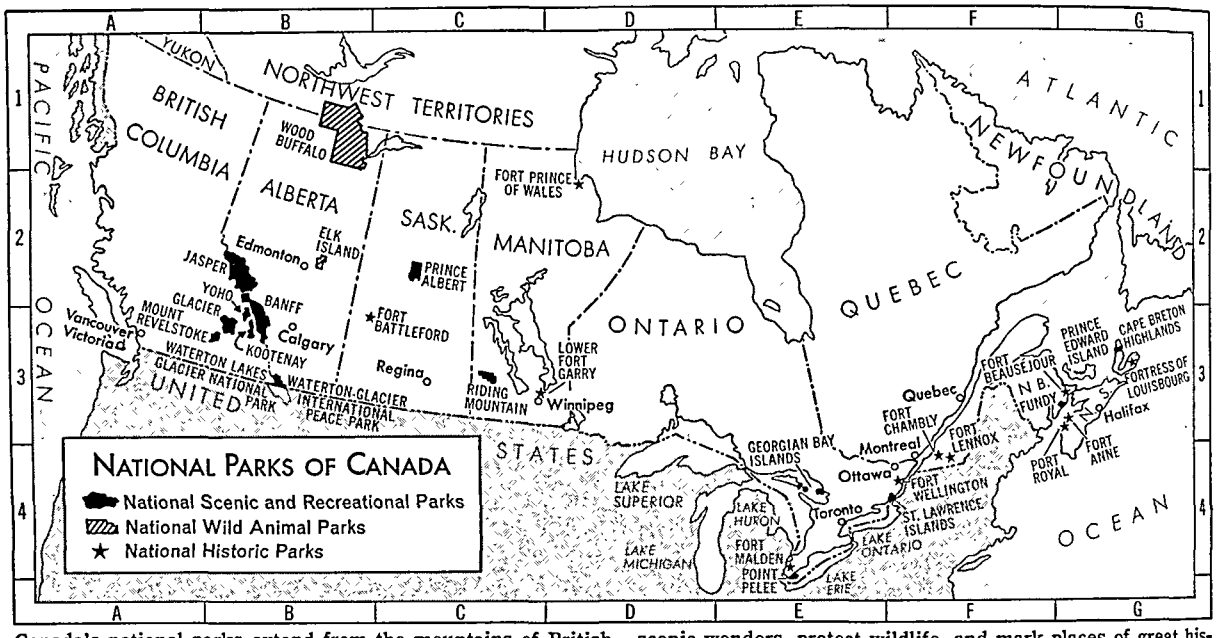
Among the older state parks the Adirondack Forest Preserve, in New York, is one of the largest, covering over 2 million acres. The Catskill Forest Preserve, in New York, contains about 234,000 acres. Custer State Park, in the Black Hills of South Dakota, covers 70,000 acres. The Dunes State Park, a 2,182-acre park in Indiana, on the shore of Lake Michigan, is within easy reach of the Chicago region.

County and municipal parks on the fringes of large cities are growing rapidly. The Cook County Forest Preserves provide Chicago with over 38,000 acres of recreation area. Long Island and Westchester parks near New York City total about 28,000 acres. Phoe-

SPRING MILL STATE PARK, INDIANA



Spring Mill State Park centers around a pioneer village of the early 19th century. It has been restored with private homes, gristmill, apothecary's shop, bootshop, and other buildings of the period. This is the tavern, dating from 1824.



Canada's national parks extend from the mountains of British Columbia to the Atlantic shores of Nova Scotia. They preserve scenic wonders, protect wildlife, and mark places of great historic interest for the recreation and education of the people.

nix, Ariz., has an out-of-the-city park of over 14,000 acres, and Denver's parks cover nearly 13,000 acres.

National Parks of Canada

Canada has set aside three types of national parks: National Scenic and Recreational Parks (N. S. R. P.), National Wild Animal Parks (N. W. A. P.), and National Historic Parks (N. H. P.). They are as follows:

Banff N. S. R. P., 1885, Alberta, 1,640,960 acres; on east slope of Rockies; many peaks of over 11,000 feet; Mount Assiniboine, nearly 12,000 feet high; embraces vast Columbia ice field, a remnant of the Ice Age; park includes Lake Louise and town of Banff; scenic highways to parks to the north and west (B 2)*.

Cape Breton Highlands N. S. R. P., 1936, Nova Scotia, 249,600 acres; rugged coast line with mountain background; sea views from highway (Cabot Trail); interior wilderness of lake and forest; picturesque fishing villages nearby (*see* Cape Breton Island) (G 3)*.

Elk Island N. W. A. P., 1913, Alberta, 48,000 acres; herds of buffalo, moose, elk, and deer (B 2)*.

Fundy N. S. R. P., 1947, New Brunswick, 51,200 acres; scenic area overlooking the Bay of Fundy (G 3)*.

Georgian Bay Islands N. S. R. P., 1929, Ontario, 3,456 acres; island reservations in scenic Georgian Bay (E 4)*.

Glacier N. S. R. P., 1886, British Columbia, 333,440 acres; magnificent scenery in Selkirk Mountains (B 3)*.

Jasper N. S. R. P., 1907, Alberta, 2,688,000 acres; immense mountain wilderness; Mount Edith Cavell and Angel Glacier; Athabaska River valley, route of the historic Athabaska Trail to west coast; wildlife refuge (B 2)*.

Kootenay N. S. R. P., 1920, British Columbia, 347,520 acres; highway park extending five miles on each side of 63-mile section of Banff-Windermere Highway (B 3)*.

Mount Revelstoke N. S. R. P., 1914, British Columbia, 64,000 acres; alpine plateau formed by summit of mountain, on west slope of Selkirk Mountains; spectacular highway (B 3)*.

Point Pelee N. S. R. P., 1918, Ontario, 3,840 acres; most southerly mainland point of Canada on Lake Erie; fine beaches; bird sanctuary; unique flora (E 4)*.

Prince Albert N. S. R. P., 1927, Saskatchewan, 957,440 acres; forested wilderness, many lakes and streams (C 2)*.

Prince Edward Island N. S. R. P., 1937, 4,480 acres; coastal strip on north shore of Prince Edward Island. Contains "Green Gables," farmhouse made famous by Lucy M. Montgomery's 'Anne of Green Gables' (G 3)*.

Riding Mountain N. S. R. P., 1929, Manitoba, 734,720 acres; rolling woodlands; lakes; wildlife refuge (C 3)*.

St. Lawrence Islands N. S. R. P., 1914, Ontario, 189 acres; mainland area and several of the Thousand Islands in the St. Lawrence River (F 4)*.

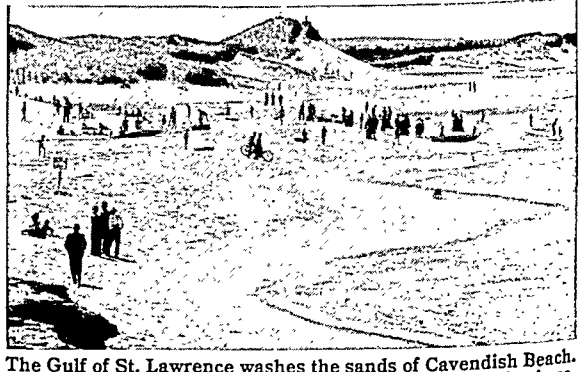
Waterton Lakes N. S. R. P., 1895, Alberta, 130,560 acres; Canadian section of Waterton-Glacier International Peace Park. Continental Divide forms the border line between Alberta and British Columbia and the west limit of the park (B 3)*.

Wood Buffalo N. W. A. P., 1922, Alberta and Northwest Territories, 11,072,000 acres; forests, plains (B 1)*.

Yoho N. S. R. P., 1886, British Columbia, 324,480 acres; on west slope of Rocky Mountains; famed Yoho Valley, with waterfalls 1,200 feet high, and beautiful Kicking Horse Valley; several peaks more than 10,000 feet high; glaciers and vast ice fields (B 3)*.

*Letters and numbers in parentheses give location on map above.

PRINCE EDWARD ISLAND NATIONAL PARK



The Gulf of St. Lawrence washes the sands of Cavendish Beach. This park is a coastal strip along the island's north shore.

Canada has 11 national historic parks. Fort Anne (G3)*, at Annapolis Royal, Nova Scotia, is the site of the Acadian settlement of Port Royal. Nearby is Port Royal (G3)*, a reconstruction on the site of the "Habitation" erected by De Monts and Champlain in 1605. Fort Beauséjour (G3)*, in New Brunswick, and the Fortress of Louisbourg (G3)*, on Cape Breton Island, were built by the French in the 18th century. In Quebec are Fort Chambly (F4)* and Fort Lennox (F4)*, both on the Richelieu River. In Ontario are Fort Wellington (F4)*, on the St. Lawrence River, and Fort Malden (E4)*, on the Detroit River. In Manitoba are Fort Prince of Wales (D2)*, near Churchill, and Lower Fort Garry (C3)*, north of Winnipeg, built by the Hudson's Bay fur-trading company in 1733–71 and 1831–39 respectively. South of North Battleford, in Saskatchewan, is Fort Battleford (B3)*, a North West Mounted Police post built in 1876.

Some of Canada's provincial parks are larger than the national areas. Algonquin Park in Ontario covers 1,754,240 acres; Laurentides Park in Quebec contains 2,373,120 acres; and Tweedsmuir Park in British Columbia contains 3,456,000 acres.

Similar Parks in Many Lands

The largest park developments in other countries have been made in the more recently settled parts of the world. Alarmed by the disappearance of big game, African governments have set aside a large number of wild-animal sanctuaries. The wonderful Albert National Park in the Belgian Congo was reserved by King Albert of Belgium in 1925 at the suggestion of the American explorer Carl Akeley to protect its gorillas and other rare animals. It covers more than 1,920,000 acres. The Union of South Africa in 1926 established Kruger National Park, a big-game reserve of 5,632,000 acres. The tremendous Etosha Reserve of 17,664,000 acres in South West Africa, the 3,840,000-acre Tsavo National Park in Kenya, and the Bontebok, Kalahari Gemsbok, Addo Elephant, Mountain Zebra, and Bamingui parks, all protect animals threatened with extinction.

Australia has numerous parks to protect its unique native animals. In New Zealand are the scenic Tongariro, Mount Egmont, and Sounds parks. In India, Asiatic animals find sanctuary in the Hailey National Park of 80,640 acres in the foothills of the Himalayas. Krakatoa in the East Indies, scene of the greatest volcanic eruption of modern times, has been reserved for biological and geographical studies.

In 1931 Japan passed a national parks law based on the American system. Among the many parks are the Fuji-Hakone, which embraces Mt. Fujiyama, the perfect volcanic cone. Setonaikai (Inland Sea) includes varied island and coastal land forms that illustrate the geologic evolution of the islands. In Hokkaido park are beautiful crater lakes. The Japan Alps National Park, along the "backbone" of Honshu, is a mountain wilderness, including 40 peaks over 8,000 feet high. Lovely Nikko, with its sacred temples amid ancient trees and gardens, lies in a mountainous area.

Latin American nations have set aside some of their most interesting areas in recent years to save them from exploitation. The Galápagos Islands were declared a national park by Ecuador in 1936, and research stations were established to study their plant and animal life. Easter Island (*see* Easter Island) and the Juan Fernandez Islands (*see* Crusoe) are national parks owned by Chile. Argentina's Nahuel Huapi includes in its 2 million acres a number of exquisite lakes in the foothills of the Andes Mountains; and the Iguassú National Park, on the Argentine-Brazilian boundary, contains one of the world's greatest waterfalls. The Organ Mountains National Park of Brazil, near Rio de Janeiro, was created in 1939. Mexico has several national parks, including the Cacahuamilpa Caves in the state of Guerrero; the mountain peak known as Volcan Nevado de Colima, in Colima; Cerro de Garnica, a mountain in Michoacan; and El Potosí, a wild-flower and wildlife reserve in the state of San Luis Potosí. The village of Taxco is a national monument, preserved as a gem of colonial Spanish architecture. No modern construction is permitted. Venezuela's Codazzi Park preserves 115 acres of ancient *samans*, or rain trees.

The Pan American convention on "Nature Protection in the Western Hemisphere" came into force on May 1, 1942, for the United States, Guatemala, Venezuela, El Salvador, and Haiti. The treaty was later signed by the Dominican Republic, Mexico, Ecuador, Argentina, Nicaragua, Peru, and Brazil.

The treaty provides for the creation of national parks, wilderness reserves, and wildlife sanctuaries in the signatory countries. It protects migratory birds and vanishing species. It encourages co-operation in scientific field studies and controls the illegal import and export of plants and animals.

In Great Britain property is acquired under the National Parks and Access to the Countryside Act. The Lake District (554,240 acres) and Peak District (346,880 acres) are the largest parks. Argyll National Forest in Scotland embraces about 64,000 acres of Highland country. Snowdonia National Park in Wales covers 19,200 acres of hills, lakes, and forests. The British "long-distance footpaths" correspond to the Appalachian Trail in the United States.

Russia's Kuban Park in the northwestern Caucasus is a wild mountainous area with large sections of virgin forest and fragrant alpine meadows inhabited by ibex and chamois. The Swiss National Park embraces 37,120 acres in the wildest and most rugged part of the eastern Alps. Italy's Gran Paradiso Park in the high Alps covers 185,600 acres. Stelvio Park, also in the Alps, harbors ibex, chamois, and other animals in its woodlands. The Abruzzi Park, in the central part of the peninsula, is notable for its forests, flowers, and animal life. France's largest park is the Pelvoux (64,000 acres) in the Alps near Grenoble. The Camargue (38,400 acres) is in the Rhone delta, where the shallow ponds attract multitudes of water fowl and other migratory birds. Germany has many forested game reserves and "nature monuments."

*Letters and numbers in parentheses give location on map on page 38/.

HYMNS *that* FIRE *the Hearts of* NATIONS

The Spirit of a People Expressed in their Songs—Origin of the Famous 'Marseillaise' —How England's National Anthem is Echoed in Other Lands—'The Star-Spangled Banner' and the 'Battle Hymn of the Republic'

NATIONAL SONGS. In every nation some tune is closely associated with the love of the people for their country. It moves them like the rippling folds of a waving flag, or the face of a loved ruler. To its patriotic words the national anthem adds the appeal of stirring music. Children chanting its verses feel a deep loyalty they but dimly understand. Its strains rouse men far more quickly than the most passionate orations.

The best loved national songs have arisen in time of crisis. Francis Scott Key wrote 'The Star-Spangled Banner' during the bombardment of Fort McHenry, near Baltimore, in the War of 1812. Rouget de Lisle called fellow citizens to arms with the ringing phrases of the 'Marseillaise' during the French Revolution. 'The Wearing of the Green' was the outcry of the Irish rebellion of 1798, when the display of the shamrock emblem was forbidden.

Francis Scott Key, a young lawyer, sailed down Chesapeake Bay early in September 1814 to plead for the release of a friend who was held prisoner aboard a British warship. The British freed his friend, but detained both him and Key until after their surprise attack on Baltimore. They towed the American's small vessel, the *Minden*, to a mooring in Baltimore harbor. Key watched the bombardment from its deck, guarded by British marines. All day on September 13, the battle raged, and through the night. Key paints a picture of that crucial night, as he strained his eyes for a glimpse of the flag he called "the Star-Spangled Banner" floating from the ramparts at Fort McHenry.

PROOF THAT "THE FLAG IS STILL THERE"



During the bombardment of Fort McHenry—that anxious night of "the rockets' red glare"—Francis Scott Key, held by the British in Baltimore harbor, wrote the words of 'The Star-Spangled Banner' on the back of an old letter. This painting by H. A. Ogden shows the scene.

The poem quickly became popular, and was set to the music of an old Revolutionary song, 'Adams and Liberty', taken in turn from an English air, 'Anacreon in Heaven'. Many generations of school children had risen to honor this patriotic song before Congress officially recognized it as the national anthem of the United States in March 1931.

The tune of 'America' is the most popular patriotic air. Eleven nations have set verses to it. The stately rhythm goes back to a Saxon folk song. The words of 'America' were written by Rev. Samuel F. Smith in 1832. To this air is also sung 'God Save the King (or Queen)', Great Britain's national song.

A rollicking jig-tune whose age gives it standing among America's national songs is 'Yankee Doodle'. This is the only war song of Revolutionary days that is still commonly sung today. Its homely rhymes mock the crude manners and costumes of the raw and ill-equipped American troops. The tune is far older than the words we know, for more than a century earlier verses had been sung to it ridiculing the Cavalier troops of Charles I. Soldiers of the North in the Civil War and members of the American Expeditionary Forces during the first World War took their nickname, "Yanks," from its title.

'Hail Columbia', written by Joseph Hopkinson in 1798, is almost as old as the nation. Its tune came from 'The President's March' composed by Philip Phylo in honor of George Washington. 'Columbia, the Gem of the Ocean' is generally attributed to Thomas à Becket, an English actor who was in Philadelphia in 1843. A British version of the hymn is 'Britannia, the Pride of the Ocean'.

Some of the most inspiring American patriotic songs sprang from the turmoil of the Civil War. Julia Ward Howe's stirring 'Battle Hymn of the Republic' and George F. Root's 'The Battle Cry of Freedom' combine lofty sentiments with rousing marching tunes.

Other popular Union marching songs were 'John Brown's Body' and 'Marching Through Georgia', by H. C. Work. Though 'Dixie', by Daniel D. Emmett, originated in the North as a Negro minstrel song in 1859, it came to be the rallying song of the Confederate cause. Another popular Southern lyric was 'Maryland, My Maryland', by James Ryder Randall, sung to the melody of the German Christmas song, 'Tannenbaum'.

The Spanish-American War revived 'When Johnny Comes Marching Home', written during the Civil War by Patrick S. Gilmore, under the pen name Louis Lambert. Other favorites of that war were chiefly popular music hall tunes, long since forgotten. So often did military bands play 'There'll be a Hot Time in the Old Town Tonight' that Cuban natives thought it was the American national anthem.

During the first World War many new songs appeared. Singing was recognized as a valuable aid to morale, and song leaders were in every camp of American soldiers. The new songs ranged from humorous and sentimental ballads to stirring march airs that rang with the tramp of feet along French highways. Civilians in England and the United States echoed soldier voices with 'It's a Long, Long Way to Tipperary', 'Keep the Home Fires Burning', 'Pack Up Your Troubles in Your Old Kit Bag', 'Over There', 'K-K-K-Katy', 'There's a Long, Long Trail', 'Smiles', and many more.

War Songs of the Allies

In the first World War America became acquainted with the national anthems of allied lands. Students learned the words, and audiences rose as bands played the airs. 'La Marseillaise', France's flaming anthem, always aroused enthusiasm. More familiar grew the British patriotic hymns: 'God Save the King', by Henry Carey; 'Rule Britannia!', by J. Thomson and Dr. T. A. Arne; 'The Maple Leaf Forever', a patriotic song of Canada by A. Muir; 'The Song of Australia', by Mrs. C. J. Carleton and Carl Linger; the Irish 'Wearing of the Green'; the Scottish 'Scots Wha Hae wi' Wallace Bled' and 'We'll Hae Nane but Highland Bonnets Here', and the Welsh 'Men of Harlech'.

Belgium's 'La Brabançonne' had appeared during a previous life-struggle of this battle-scarred nation—the war that freed her from Dutch rule. The verses were written by Jenneval and set to music by François van Campenhout.

After the first World War Europe saw many changes in national songs as well as in governments. To the Italian national air, 'The Royal March', by G. Gabetti, was added the Fascist hymn, 'Giovinezza'. (When the Fascists were driven from power in 1943, 'Giovinezza' was immediately outlawed.) 'Garibaldi's Hymn' by Luigi Mercantini, music by Alessio Olivieri, has long been a favorite in Italy.

The Austrian republic abandoned the national anthem of the empire, 'Gott Erhalte Unsern Kaiser' (God Preserve Our Emperor) sung to music by Franz Joseph Haydn. The various parties in power before Austria's annexation to Germany tried to establish a successor. One favorite was 'Oesterreichische Bundeshymne', with words by Karl Renner and music by Wilhelm Kienzl. The national anthem of the Hungarians is 'Magyar Himnusz' (Hungarian Hymn).

AMERICA

My country, 'tis of thee,
Sweet land of liberty,
Of thee I sing;
Land where my fathers died,
Land of the Pilgrims' pride,
From every mountain side
Let freedom ring.

My native country, thee—
Land of the noble free—
Thy name I love;
I love thy rocks and rills,
Thy woods and templed hills;
My heart with rapture thrills
Like that above.

Let music swell the breeze,
And ring from all the trees
Sweet freedom's song;
Let mortal tongues awake,
Let all that breathe partake,
Let rocks their silence break,
The sound prolong.

Our fathers' God, to Thee,
Author of liberty,
To Thee we sing:
Long may our land be bright
With freedom's holy light,
Protect us by Thy might,
Great God, our King.

THE STAR-SPANGLED BANNER

O say, can you see, by the dawn's early light,
What so proudly we hailed at the twilight's last gleaming?
Whose broad stripes and bright stars, through the perilous fight,
O'er the ramparts we watched, were so gallantly streaming!
And the rocket's red glare, the bombs bursting in air,
Gave proof through the night that our flag was still there:
O say, does that star-spangled banner yet wave
O'er the land of the free and the home of the brave?

On the shore, dimly seen through the mists of the deep,
Where the foe's haughty host in dread silence reposes,
What is that which the breeze, o'er the towering steep,
As it fitfully blows, now conceals, now discloses?
Now it catches the gleam of the morning's first beam,
In full glory reflected now shines on the stream:
'Tis the star-spangled banner! O long may it wave,
O'er the land of the free and the home of the brave!

And where is that band who so vauntingly swore
That the havoc of war and the battle's confusion
A home and a country should leave us no more?
Their blood has washed out their foul footsteps' pollution.
No refuge could save the hireling and slave
From the terror of flight, or the gloom of the grave:
And the star-spangled banner in triumph doth wave
O'er the land of the free and the home of the brave.

Oh! thus be it ever, when freemen shall stand
Between their loved homes and War's desolation!
Blest with victory and peace, may the Heav'n-rescued land
Praise the Power that hath made and preserved us a nation.
Then conquer we must, for our cause it is just,
And this be our motto: "In God is our trust."
And the star-spangled banner in triumph shall wave,
O'er the land of the free and the home of the brave.

In Russia, the 'Internationale' replaced a prayer for the czar. (In 1944, the 'Hymn of the Soviet Union' replaced the 'Internationale'.) The Poles sang 'Jeszcze Polska nie Zginela' (Poland's Not Yet Dead in Slavery), written 1830. In Czechoslovakia, before the German conquest, the Czech anthem was 'Kde Domov Muj' (Where Is My Homeland?), and the Slovaks sang 'Nad Tatrou Se Blyska' (Lightning Above the Mountains). The Bohemian 'War-Song of the Hussites' was first heard in the 15th century. The Yugoslav anthem 'Bože Pravde' (God of Justice) comprises the first stanzas from the old national hymns of Serbia, Croatia, and Slovenia.

Songs of Germany and Scandinavia

'Deutschland, Deutschland über Alles' (Germany Above All), the poem written by Hoffmann von Fallersleben in 1840 and set to the music of Haydn's 'Austrian Hymn', fell under the ban of the German republic after the first World War, but was later restored as the national anthem. More popular under the Nazi regime was the 'Horst Wessel Lied', written by a young Nazi leader, Horst Wessel, who lost his life in 1930. The melody is an old German folk-song. 'Die Wacht am Rhein' (The Watch on the Rhine), with verses by Max Schneckenburger to the music of Karl Wilhelm of Schmalkalden, is another favorite.

Norway's hymns are 'Sønner af Norge' (Sons of Norway) and the national song by their great poet Björnstjerne Björnson, 'Yes, We Love with Fond Devotion Norway's Mountain Domes'. In Sweden, 'Du gamla, du fria' was written by Richard Dybeck to an old folk tune, and the King's Song 'Ur svenska hjertans djup' was written by K. V. A. Strandberg with music by Otto Lindblad. In Denmark, the warlike words of 'King Kristian stod ved höjen mast' (King Christian Stood Beside the Mast) have been ringing since 1775. The words are by Johannes Evald, the music by John Hartmann. The national song of Finland is 'Maamme Laulu' (Our Land), with words by J. L. Runeberg and music by F. Pacius.

An Anthem Without Words

Two patriotic hymns are sung in the Netherlands—'Wilhelmus van Nassouwe' and 'Wien Neêrlansch Bloed'. The Swiss national anthem 'Rufst du, mein Vaterland', by Johann Wyss, is sung to the familiar tune of 'America'. There are no words to Spain's anthem, the centuries old 'Marcha Granadera', which used to be called 'Marcha Real'. 'Traeisca Regele'

ROUGET DE LISLE SINGING THE 'MARSEILLAISE'



The 'Marseillaise', the most famous of all battle hymns, was first sung by its author to a group of friends. Imagine you hear him just beginning. This is the first verse and the refrain translated into English:

Ye sons of France, awake to glory,
Hark, hark what myriads bid you rise!
Your children, wives, and grandsires hoary,
Behold their tears and hear their cries.

Shall hateful tyrants, mischief breeding,
With hireling hosts, a ruffian band,
Affright and desolate the land,
While peace and liberty lie bleeding?

To arms, to arms, ye brave!
Th' avenging sword unsheath!
March on, march on, all hearts resolved
To victory or death.

(Long Live the King) won for V. Alexandri the prize offered by the Rumanian government in 1861 for the best national anthem. The music is by E. A. Hübsch.

The Greek 'Ethnicos Ymnos' (The People's Hymn) is known in English through the translation by Rudyard Kipling. Eastward, the Persians sing 'Salamati Shah'; Egypt has the 'Salaam Effindina' (March of the Khedive); the Turkish anthem is 'Istiklal Marsi' (March of Independence); the Chinese favorite is 'Song of the Kuomintang', whose fiery words came from a patriotic address by Dr. Sun Yat-sen. Japan sings 'Kimi Ga Yo Wa' (In the Reign of Our Emperor).

Latin American national hymns blaze with a fervent love of liberty and country. They include Argentina's 'Oíd mortales, el grito sagrado' (Hear, O Mortals, the Sacred Call); Chile's 'Dulce Patria' (Dear Fatherland); Peru's 'Somos libres, seamoslo siempre' (We Are Free; Let Us Be So Ever); Brazil's 'Hymno da Proclamacão da Republica' (Hymn of the Proclamation of the Republic); Mexico's 'Mexicanos, al grito de guerra' (Mexicans, at the Cry of War); and El Salvador's 'Saludemos la Patria' (Let Us Hail Our Country).

JULIA WARD HOWE



Author of the 'Battle Hymn of the Republic', which became one of the stirring songs of the North during the trying years of the Civil War. The words, which were published in 1862, were sung to the tune of 'John Brown's Body'.

NATURALIZATION. "I hereby declare, on oath, that I absolutely and entirely renounce and abjure all allegiance and fidelity to any foreign prince, potentate, state, or sovereignty of whom (which) I have heretofore been a subject (or citizen); that I will support and defend the Constitution and laws of the United States of America against all enemies, foreign and domestic; that I will bear true faith and allegiance to the same; that I will bear arms on behalf of the United States or perform noncombat service in the Armed Forces of the United States when required by law; and that I take this obligation freely without any mental reservation or purpose of evasion: So help me God."

This is the usual oath a person takes as the final step in becoming *naturalized,* or admitted to citizenship, in the United States. It is administered in court and is often accompanied by a patriotic ceremony especially on Citizenship Day, September 17 (*see* Festivals and Holidays). After taking the oath, the new citizen receives his certificate of citizenship, or *final paper.*

The Process of Naturalization

To become naturalized an alien first obtains from the Commissioner of Naturalization a *certificate of arrival.* This gives information showing that he has been lawfully admitted to the United States. At any time after his arrival, if he is at least 18 years old, he may make his *declaration of intention* to become a citizen (or "take out his first paper") before the clerk of a court. In not less than two nor more than seven years thereafter he may file his *petition for citizenship* (second paper), if he has lived continuously in the country for five years. He must provide two witnesses who are citizens to take oath as to his good character and his five years of residence.

An examiner from the Immigration and Naturalization Service tests the applicant's knowledge of the English language and of the organization of the United States government; and makes certain that he understands and accepts the fundamental principles of the Constitution. At his final hearing in open court the applicant is further examined. Aliens are trained for naturalization in adult education classes of public school systems and by other agencies.

Not every applicant for citizenship is required to comply with the general provisions of naturalization laws. Certain exemptions are granted to such groups as members (or veterans) of the armed forces, former citizens, and the husbands or wives of citizens.

There are no barriers to citizenship because of race, sex, or marital status. Citizenship is barred, however, to polygamists, anarchists, convicted criminals, and those who advocate subversive activities. A naturalized citizen may lose his citizenship in a number of ways, such as by living two years in his native land or five years in other foreign countries after his naturalization.

A United States citizen does not forfeit his citizenship solely through marriage to an alien, nor does an alien acquire citizenship by reason of his marriage to a United States citizen. Under certain circumstances, children under the age of 18 derive citizenship through the naturalization of one or both of their parents. A determination of such citizenship is made after considering the essential facts in each individual case.

Laws and Treaties

In the United States naturalization is regulated by Congress, which makes new laws or amends old ones from time to time. All the leading nations have naturalization laws and many of them have treaties with other nations, in order to avoid difficulties resulting from transfers of citizenship or from differences in nationality laws. The United States is a party to a number of such treaties. (*See also* Americanization; Citizenship.)

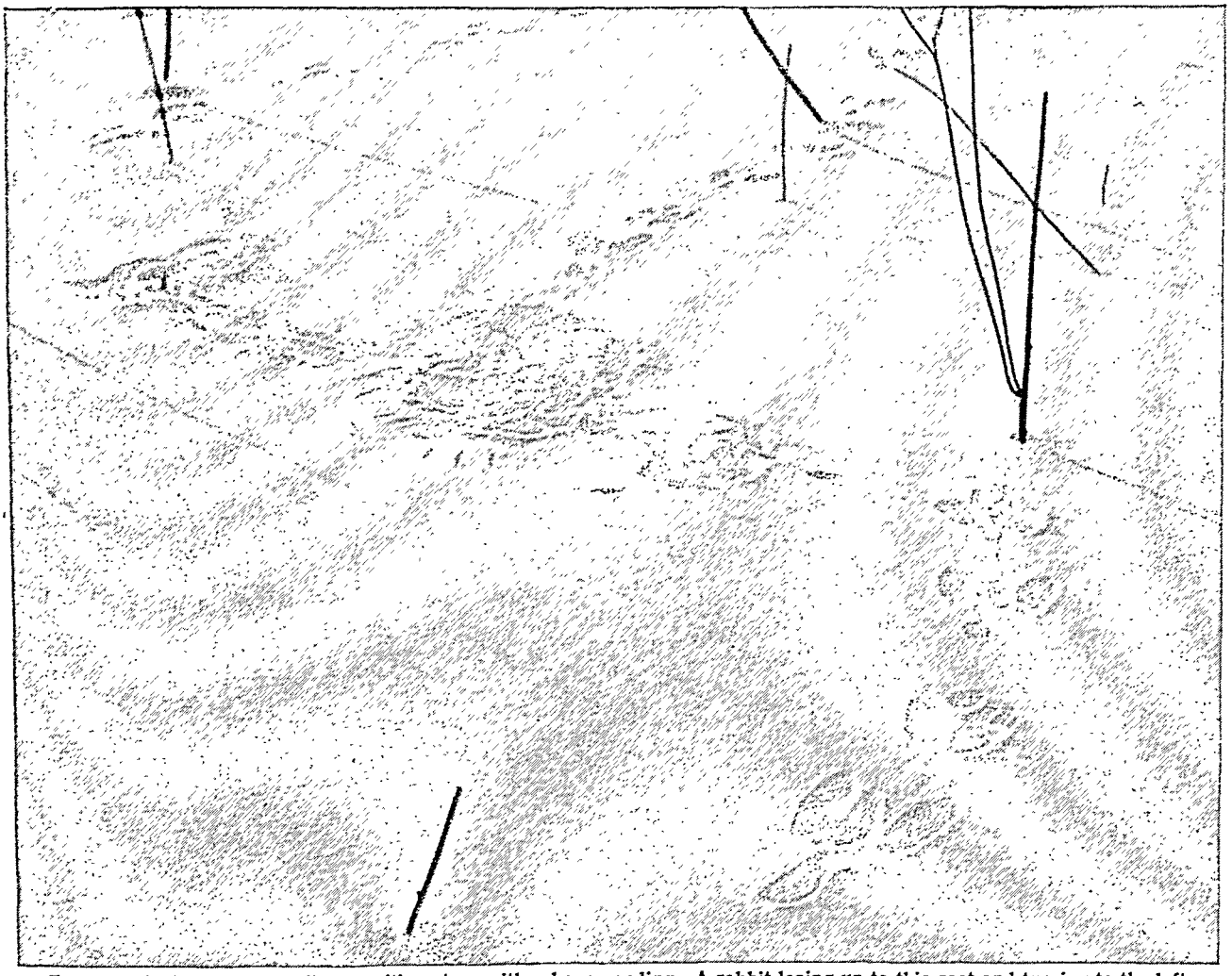


Photographed from life *By Elliot F. Porter*

A FATHER FEEDS HIS HUNGRY FAMILY

Few birds are better known or more loved than the gay, lighthearted little goldfinch, often called the wild canary. This male bird has brought a seed to his nestlings. Perhaps he is trying to decide which of the greedy mouths shall receive it.

LEARNING *to Read in* NATURE'S *Wonder* BOOK



These tracks in the snow tell an exciting story with a happy ending. A rabbit loping up to this spot and turning to the left at the tall weed was attacked by an owl or a hawk, whose beating wing tips made these short "comma marks." After a brief struggle, during which the snow was churned and trampled, the rabbit escaped and raced away.

NATURE STUDY. Everyone loves adventure stories—tales of dramatic action, of struggle and danger, of difficulties overcome, and of mysteries solved. But how many people know they can find true stories of this kind in their own backyards?

The book of nature is the most fascinating reading in the world. It is a book of *living* stories, always changing, always new. It is a mystery tale in which you yourself play the detective, seeking the answers to the most exciting questions. The story grows in interest as you grow in experience. For this is the story of Life itself, and of the Earth, which is your home.

What is the key to this enchanted book? How does one enter its pages? Microscopes, binoculars, and other tools of science are helpful. Some nature books are delightful reading. The articles in this encyclopedia and the books listed at the end of this article will provide a starting point. But the real textbook is nature herself. Wherever winds blow, sun and stars shine, snow and rain fall, plants grow, and animals live, there you find the materials for studying nature, if only you have the eyes and the *wish to see.* It isn't necessary to travel far afield. The great French naturalist Fabre, who made the stories of the insects more interesting than most novels, for 30 years never left his little farm (*see* Fabre). Another great nature writer, Thoreau, "traveled widely in Concord" (*see* Thoreau). You too may "travel widely" in your own backyard. For it is not where you go that matters, but how much you see and how well you understand it.

CAN YOU ANSWER THESE?

Why are plants green?

How does a frog prepare for winter? A muskrat? A horse? A bat?

Why should an aquarium contain plants as well as fish?

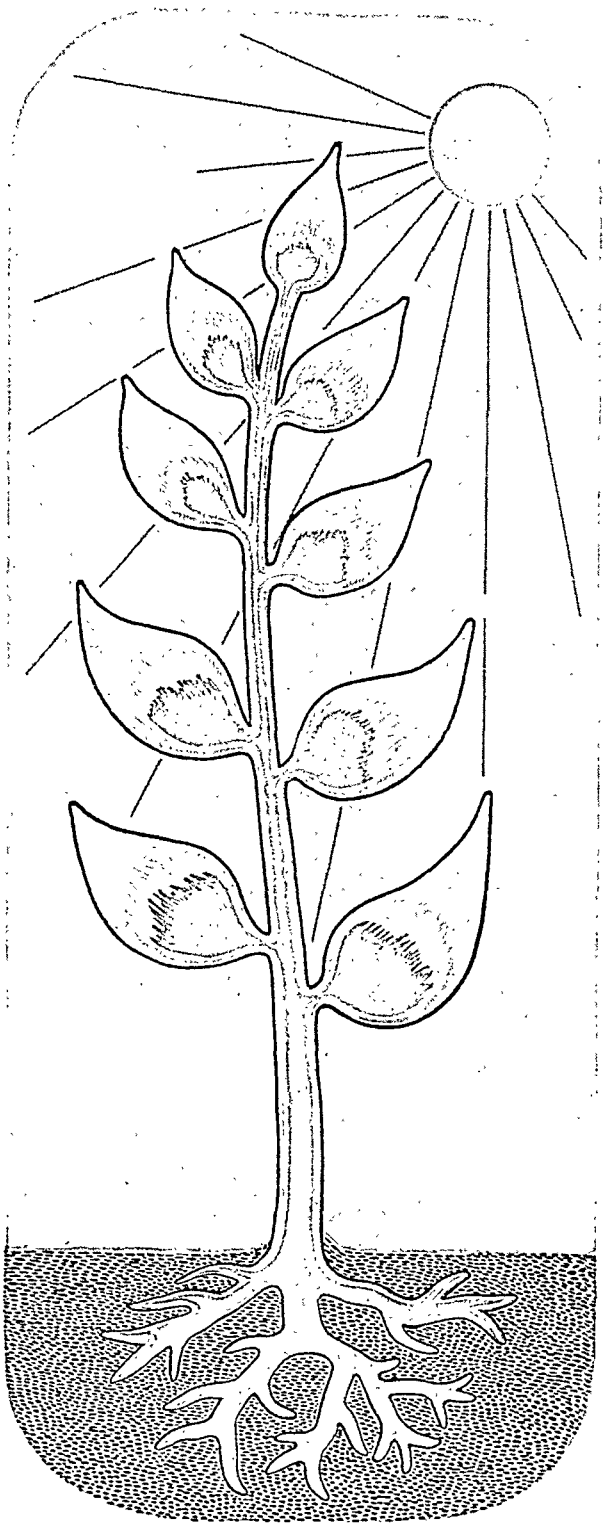
What group of plants lives on food manufactured by other plants?

What good does perfume do a flower?

Why are some seeds so made that they can travel long distances?

How does the wasp provide fresh food for the young it never sees?

How Plants Grow and Make Food



The leaves take carbon dioxide from the air. The roots absorb water. It travels up to the leaves through tiny pipes. With the aid of sunlight, the green coloring matter in the leaves breaks down the water and the carbon dioxide into their separate atoms and recombines them to form sugars and starches. Oxygen is given off to the air through pores in the leaves.

A GOOD starting point for the study of nature is a flower and vegetable garden. Everybody loves to dig in the earth. You can help to plant the seeds and keep the garden weeded. If you can have your own garden, or your own corner of the garden, so much the better. Then you are entirely responsible for its success or failure.

Wouldn't you like to know what happens to the seeds after you have placed them in the dark soil? You can't pull up the plants and still have a garden, but you can make an interesting experiment. If you will plant a lima bean in a glass-sided box you may watch it grow into a mature plant (*see* Bean).

Green plants are nature's miracle workers. The leaves of that plain little bean, the leaves of all green plants, are most amazing chemical factories. Turning sunlight, air, and water into sugar and starch, they manufacture food not only for themselves but indirectly for all animal life. Read in the articles Leaves and Plant Life how the green coloring material in the leaf, called chlorophyll (*klō'rō-fĭl*), performs this wonderful work. Look at a leaf through the microscope. You can see the tiny green dots of chlorophyll and the little mouths or pores through which the leaf breathes in carbon dioxide and breathes out moisture and oxygen.

Plants must also have water and certain minerals carried in the water. Look at the root of your bean plant through the microscope. Those tiny hairs absorb water and dissolved minerals out of the soil (*see* Root). Little pipes carry the water up through the stems of the plant to the leaves. Other pipes carry the sap, containing dissolved plant food, back from the leaves to the stems and roots.

We said that plants manufacture food for all animal life. And this includes human beings as well as fish, insects, birds, and the four-footed creatures. Even meat eaters depend on green plants indirectly. You would have no beefsteak if there were no grass for cattle to eat. Owls eat field mice; daddy longlegs eat aphids. But field mice live on grain, and aphids eat garden plants. Without plants there would be nothing for the meat eaters to feed on.

Since all life depends on the work of the green leaf, it should be interesting to make a collection of leaves. Learn to recognize the trees and shrubs in your neighborhood by their leaves. Learn the names of the weeds in your garden, lawn, and neighboring pasture or wood lot. Are they all harmful, or are some useful to man? Which ones provide food and shelter for birds and small animals?

How Plants Store Food

Plants are thrifty. They do not use all the food which the leaves manufacture for them. Some of it they store away to be used for future growth. It is this stored food that we eat. Some plants, such as carrots, beets, and turnips, which take two years to produce seed (biennials), store nourishment in their roots the first year. Spinach and cabbage store food

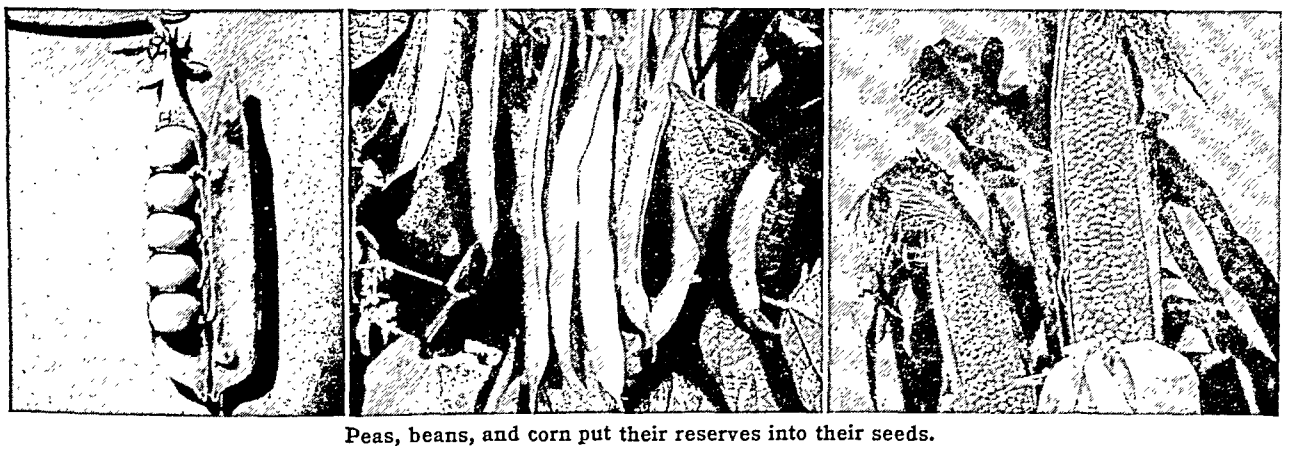
HOW PLANTS STORE THE FOOD THAT WE EAT



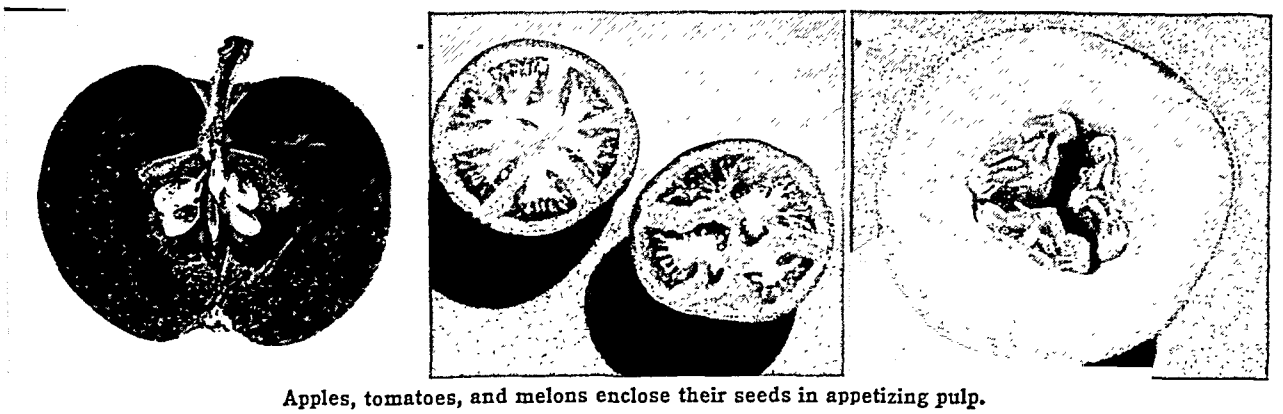
Spinach, cauliflower, and asparagus store food in leaf, flower, and stem.



Roots, tubers, and bulbs are food reservoirs for turnip, potato, and onion.

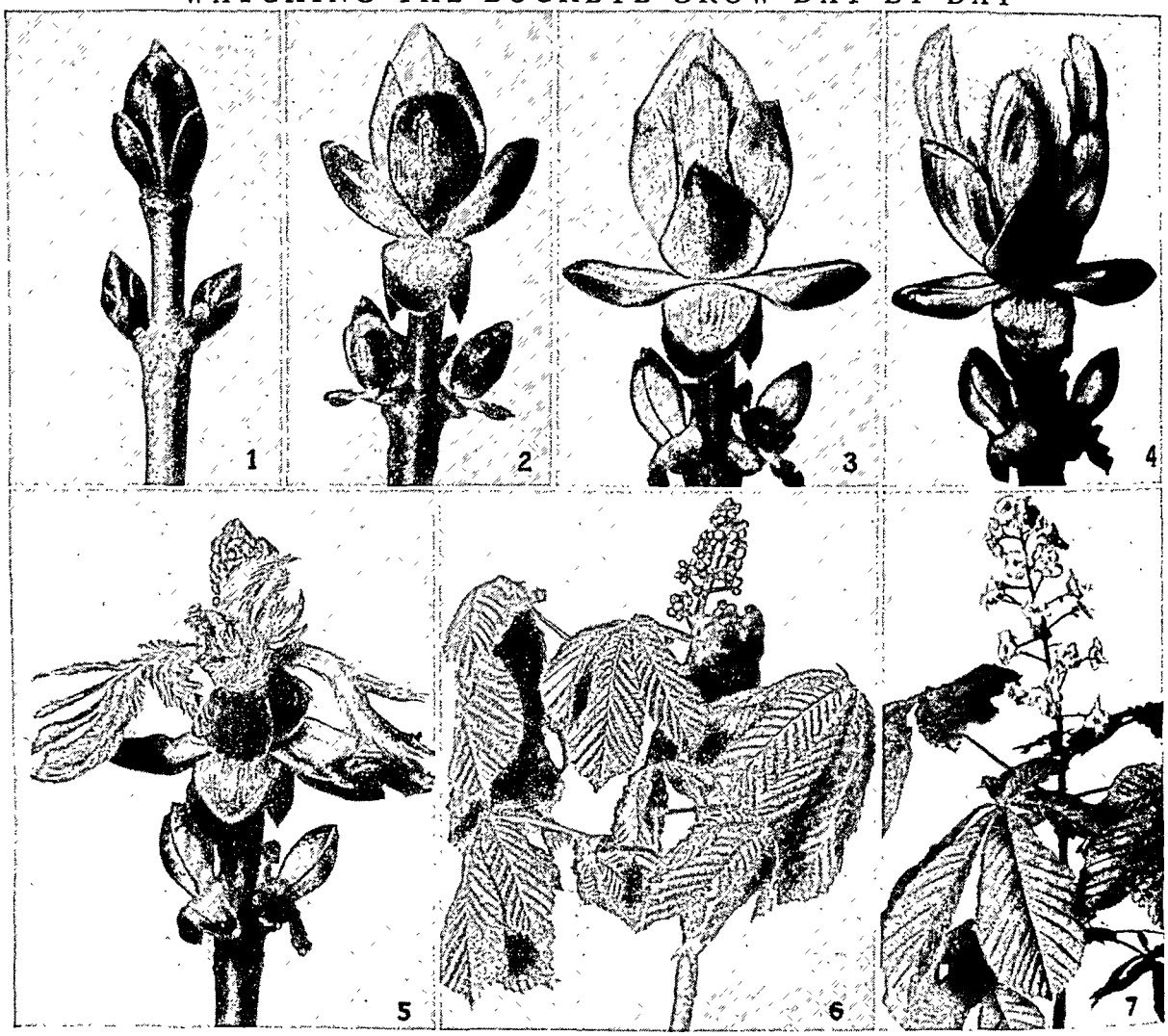


Peas, beans, and corn put their reserves into their seeds.



Apples, tomatoes, and melons enclose their seeds in appetizing pulp.

WATCHING THE BUCKEYE GROW DAY BY DAY



1. The bud on the first day of its opening. 2. Sixth day, the inner scales break away. 3. Eighth day, the last and innermost scales are pushed out. 4. Ninth day, the leaf is exposed to view. 5. On the eleventh day the leaflet becomes detached. 6. Three weeks later, the leaves have assumed their proper shape and the flower buds have sprouted. 7. Fifteen days later the flower opens.



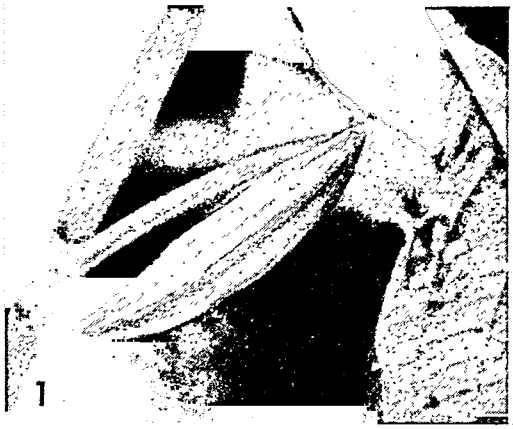
in their leaves; asparagus and rhubarb, in their stems; potatoes and onions, in tubers and bulbs. A seed contains concentrated food to nourish the tiny plant inside until it can make its own food. We eat the seeds of corn and peas and beans, but the plant intended that food for the use of its own "children."

During the late summer and fall a tree pours food into its buds. After the leaves have fallen you can see very plainly a plump little bud at the point where the old leaf grew from the branch. Cut one open and you will find a new leaf tightly curled up in its prison. During the winter it will rest there, ready to burst out with the warm sun of spring. The outside of the bud is like a warm coat, formed of overlapping scales which protect the tender leaves.

In the late summer and fall too you will discover that your flowers and weeds are "going to seed." How do plants produce seeds and why (*see* Seeds)? Make a collection of seeds and mount them beside the leaves of the plant to which they belong. Find examples of seeds that float with filmy sails and seeds with stiff gliding sails; of cannon-shot seeds; seeds that steal rides on animals' furry coats and boys' trouser legs; seeds that float on water like tiny water wings; and seeds that pay for their rides with the nourishing fruit that surrounds them. Why is a seed so made that it can travel long distances? What do you think would happen to the seeds if they all fell to the ground under the parent plant? Could very many of them develop into new plants?

HOW SEEDS ARE SCATTERED













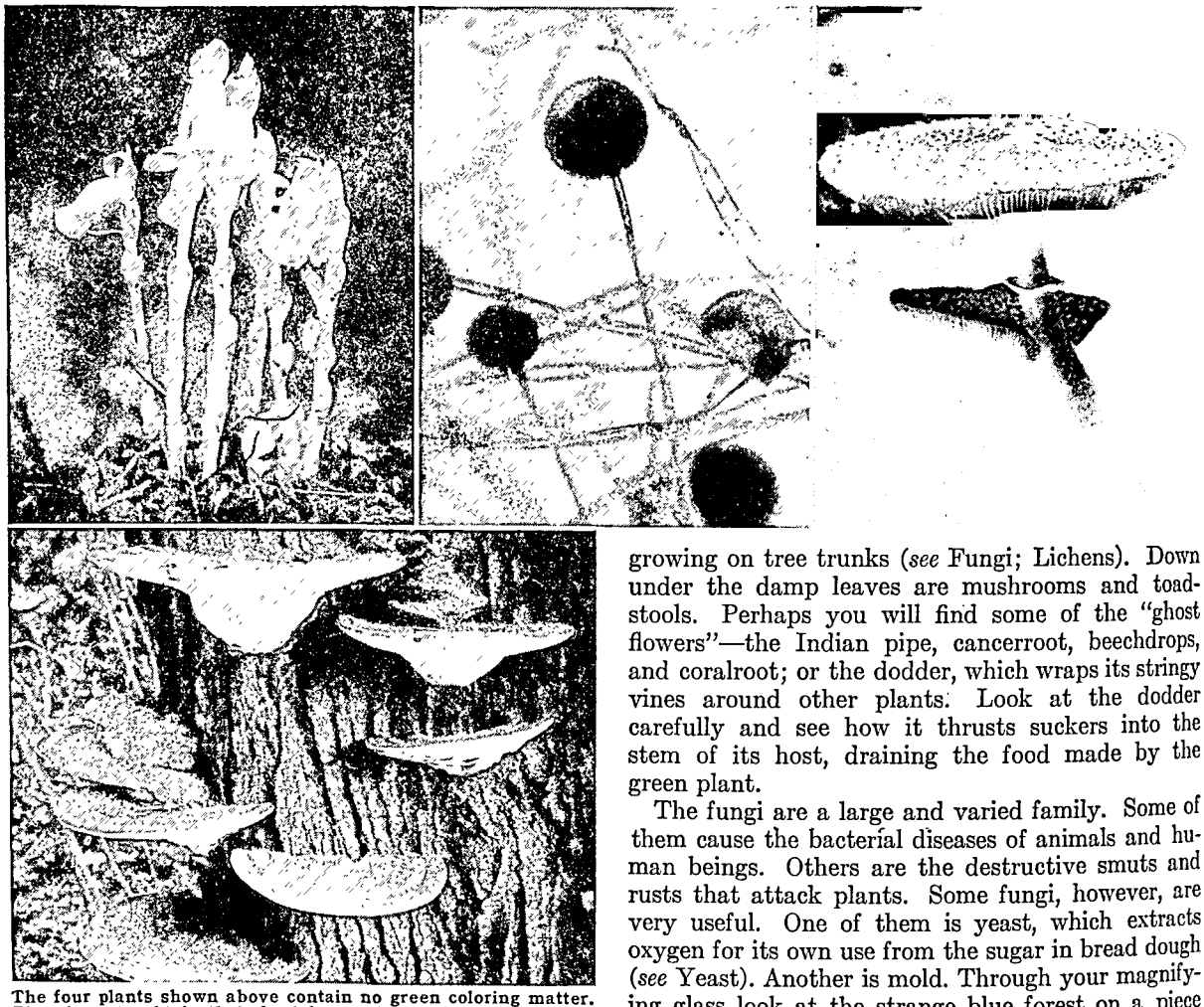






When the ripe seed pod of the jewelweed (1) is touched it bursts open and shoots its seeds (2) to a considerable distance. The wind carries the maple seed (3) on stiff, gliding wings. Milkweed seeds (4) float on filmy sails. Red mulberry seeds (5) are scattered by birds. Cocklebburs (6) have barbed spines that stick to the hair of a dog or other animal. Squirrels disperse acorns (7) by burying them in some secret hiding place. The seeds of grains, such as wheat (8), are scattered throughout the world by the farmer.

GHOST PLANTS THAT CANNOT MAKE THEIR OWN FOOD



The four plants shown above contain no green coloring matter. They have to obtain their food from other plants. The Indian pipe (upper left) finds its nourishment in the decaying vegetable matter of moist woods. Bread mold (upper center), shown here as the microscope sees it, grows on stale bread. The mushroom (upper right) and the bracket fungi (lower left) are growing out of tree trunks.

Some green plants are so small or so unlike the familiar flowering plants that you may not yet be acquainted with them. The scum on quiet pond water is made up of colonies of plants called algae (*see* Algae). If you have ever looked at the beautiful patterns of algae in a microscope you will never again think of scum as something ugly or unclean.

Another lowly but useful and interesting group of plants are the mosses (*see* Moss). They too are very beautiful under the microscope, and you will want to learn their names. The algae and mosses were among the first plants to develop on the earth, the ones that prepared the way for the higher plants.

How Non-Green Plants Get Their Food

All the plants we have been talking about contain chlorophyll. Many plants, however, lack the magic greenness. They must obtain their food from dead plant and animal matter or from the living tissues of green plants and animals. In your walks through the woods you will find lichens and bracket fungi growing on tree trunks (*see* Fungi; Lichens). Down under the damp leaves are mushrooms and toadstools. Perhaps you will find some of the "ghost flowers"—the Indian pipe, cancerroot, beechdrops, and coralroot; or the dodder, which wraps its stringy vines around other plants. Look at the dodder carefully and see how it thrusts suckers into the stem of its host, draining the food made by the green plant.

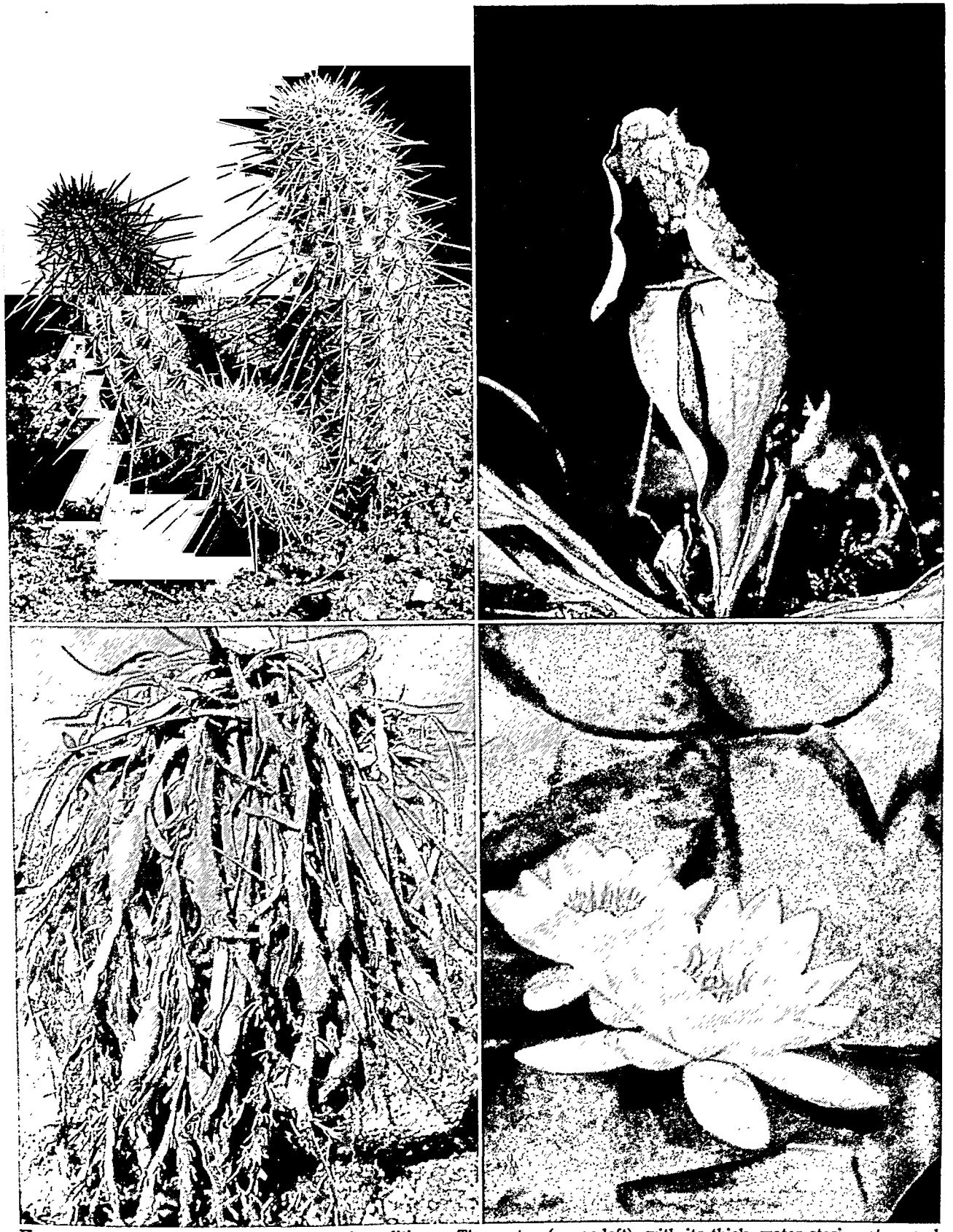
The fungi are a large and varied family. Some of them cause the bacterial diseases of animals and human beings. Others are the destructive smuts and rusts that attack plants. Some fungi, however, are very useful. One of them is yeast, which extracts oxygen for its own use from the sugar in bread dough (*see* Yeast). Another is mold. Through your magnifying glass look at the strange blue forest on a piece of moldy bread. It is related to the wonderful new drug penicillin, which is curing many dangerous diseases (*see* Antiseptics).

The Adaptability of Plants

The remarkable adaptability of plants permits them to live throughout the earth and under the most unfavorable conditions. We have just learned about plants that have adjusted themselves to living without chlorophyll and without sunshine. Desert plants have learned to conserve water by reducing their leaves to spines and developing stems that are like thick storage tanks (*see* Cactus). In shallow ponds plants have broad, flat leaves that float on the surface of the water like rafts, anchored to the bottom by long, stout stems. In the ocean the ribbon-like leaves of many seaweeds keep afloat by means of countless little air bladders.

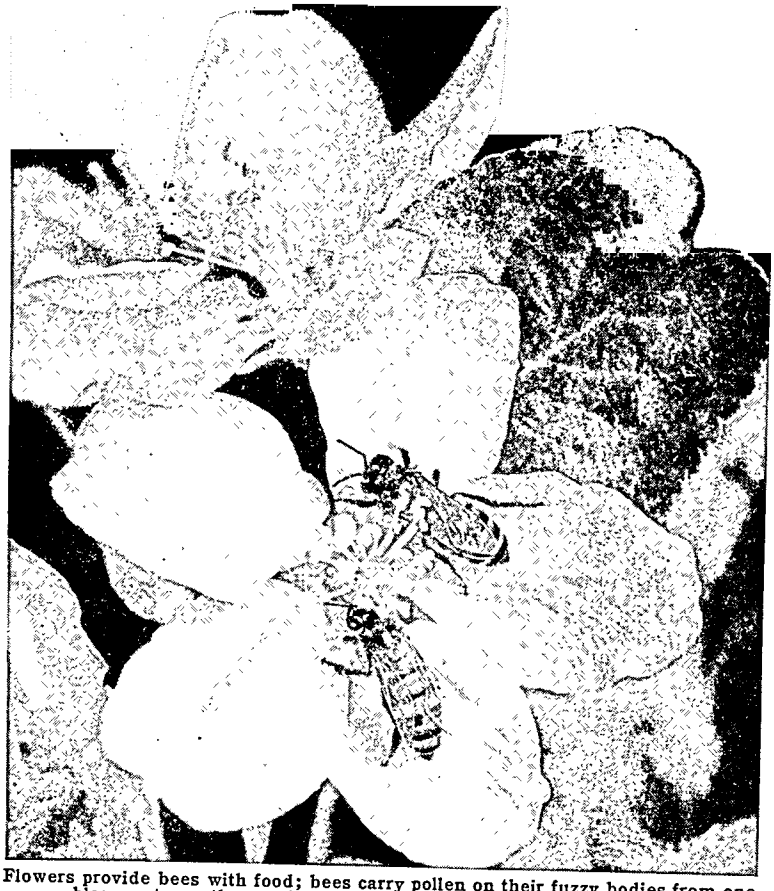
You know, of course, that animals eat plants. Do you know that some plants eat animals in order to obtain certain minerals that are lacking in the soil? Look in swampy places for a pitcher plant, bladderwort, sundew, or Venus's-flytrap. The endless variety of plant life is a fascinating study and one that cannot be exhausted in a lifetime.

HOW PLANTS ADAPT THEMSELVES



Here are four plants that live under special conditions. The cactus (upper left), with its thick, water-storing stem and leaves reduced to spines, thrives in the desert. The pitcher plant (upper right) lives in swampy places where it supplies certain food needs by devouring insects. Each leaf is an exquisite little pitcher designed to attract its victims. The seaweed (lower left) floats on the surface of the ocean by means of air bladders. The water lily (lower right) lifts its leaves to the surface on long stems rooted in the lake bottom. Notice how the edges of the leaves turn up to form small "flatboats" that help to support the flowers.

How Plants and Animals Depend on One Another



Flowers provide bees with food; bees carry pollen on their fuzzy bodies from one blossom to another, which helps to produce seeds for new plants.

IF YOU are taking good care of your garden the insects, bugs, and other small creatures will make you notice them whether you want to or not. Next time you go weeding, look at them with a magnifying glass. You've often seen daddy longlegs. Did you know that they carry their eyes on a sort of "conning tower" mounted in the middle of their backs? Did you ever look in the face of a June bug? It resembles a rather stupid puppy, with antennae like a pair of palm-leaf fans waving ridiculously where the ears should be.

Watch bees, wasps, and moths. Like all the other insects, they are in search of food. Their food is the nectar at the heart of a flower. As they crawl about in the flower the pollen sticks to their furry legs. When they visit another flower some of the pollen brushes off. Every flower that these insects visit gets a little pollen from some other flower. Many plants depend entirely on insects to pollinate them. They cannot develop new seeds unless pollen gets down into the part of the flowers where the seeds grow. The beautiful colors and forms of flowers and their perfume are designed by nature to attract insects. So insects and flowers act as partners. We learned that animals cannot live without plants. Now we discover that many of the plants we know today cannot live without animals. For insects, you know, are animals. Without insects we would have practically no fruits. Many vegetables, trees, shrubs, and flowers would disappear. There would be no cotton or linen, no coffee or tobacco.

Few of our plants could grow without birds. Do you know why? Birds eat enormous numbers of insects. Many of these insects are plant eaters. If they were not checked by their enemies they would increase in numbers and destroy all plant life. Watch the birds in your neighborhood and try to find out what they are eating. Snakes, frogs, toads, and bats also eat insects, and should be protected as good friends of the farmer and gardener.

On the stems of your garden plants, and where the leaves join the main stalk, you will probably find aphids. They are tiny insects, pale and fragile looking. With the magnifying glass look at the sharp beaks with which they pierce the plant tissues. Aphids are harmful to your garden, and you will have to kill them. But they are very useful to the ants, who "milk" them to obtain a sweet substance that comes from their bodies. They even pasture them and provide them with shelter in underground "stables" (*see* Aphids).

The policemen of your garden are the ladybugs. Don't ever kill them, for these meat eaters help you to get rid of the destructive plant eaters (*see* Ladybug). Dragonflies kill countless houseflies, mosquitoes, and other pests. The villainous praying mantis attacks both harmful and beneficial creatures, and sometimes becomes a pest himself (*see* Dragonfly; Mantis). Have you noticed that your garden is a veritable battleground? Here constant warfare is waged to *eat* and to keep from *being eaten*.

The Earthworm's Food Exchange

Dig up a spadeful of earth. You will find some earthworms. Earthworms turn over and loosen soil like tiny plowmen (*see* Earthworm). Only through loose soil can air and water get down to the roots of plants. Thus earthworms make it possible for plants to grow by loosening soil and letting in air and water. The plants in turn provide food for the earthworms as their leaves drop off and decay in the soil.

A walk through the woods and fields with wide open eyes will reveal many other examples of interdependence. We have already learned how non-green plants obtain their food from living green plants and from dead and decaying plant and animal material. Plants help one another in other ways too. The vine climbs up into the light and air on the strong trunk of

INSECT FRIENDS AND ENEMIES



The dragonfly (1), the praying mantis (2), and the ladybird beetle (6) are all useful, for they destroy harmful insects. The grasshopper (3) attacks field crops, and the Japanese beetle (4) destroys almost every kind of tree and garden plant. The cricket being devoured head first by a horned toad (5) will eat almost anything, and is not a very welcome visitor. The housefly (7) is a disease carrier. Aphids (8) are garden pests. These small, colorless insects on the stem of a rose bush are being "herded" by an ant "dairyman."

THE MEADOWLARK USES PLANTS FOR SHELTER AND INSECTS FOR FOOD



The mother meadowlark is bringing a grasshopper to her hungry babies. The nest, placed on the ground, is made of grasses. Its beautifully shaped dome conceals it from an enemy looking down from above. How do plants and animals serve the meadowlark?

the tree. The shade-loving violet hides from the too-strong rays of the sun in the shelter of the deep woods.

Lie flat on your stomach on the edge of a shallow pond or stream and look down into the clear water. You will see queer little things moving about—bundles of sticks and rubbish. Collect them and keep them in fresh water. Inside these odd houses are caddis fly larvae. The larva protects its soft body by building around it a covering of sticks or any other hard material available. A glue-like substance from the body of the insect holds the sticks in place. If it has to move, it thrusts out its head and front legs and drags the house along with it. If an enemy appears, it draws back into the shelter of this "trailer" home and escapes notice.

How many other animal homes can you find that are made of plant materials? The robin's nest of sticks and leaves, the warbler's nest of moss, and the woodpecker's hole in a tree are examples. You may find a skunk's nest of leaves and grass in a hollow log, a muskrat colony, or a fox's den. Many animals, therefore, depend on plants not only for food, but for shelter against enemies and weather.

SQUIRRELS AS TREE PLANTERS



The squirrel gathers nuts as they fall from the tree in autumn and stores them in underground hiding places. Many of his hoards are never eaten. He may be killed, or he may store more than he needs. The nuts sprout to become new trees and they provide more nuts for future generations of squirrels. So nut trees and squirrels help each other.

Other Ways in Which Animals Use Plants

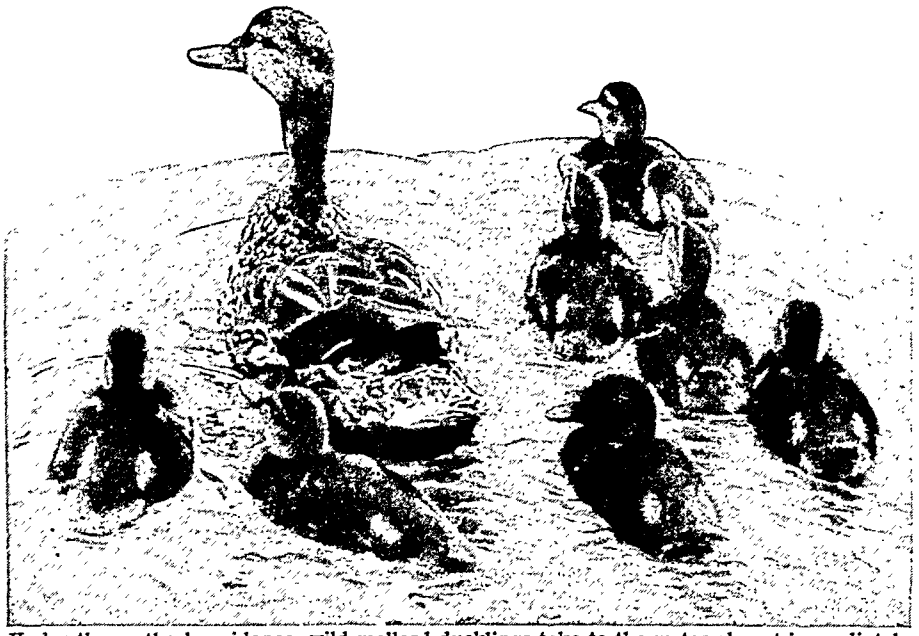
Termites make their homes in wood and then eat up their homes. They are thus doubly dependent on plant life. Moreover, they couldn't exist without the help of other animals—tiny creatures called protozoa, which live in their intestines and digest the wood fiber for them. Read in the article on Termites about the partnership between these insects and the protozoa.

Plants serve all animal life in a very important way by breathing oxygen and moisture into the air through their leaves. Animals, in turn, breathe in the oxygen and breathe out carbon dioxide, which the plants need. This interesting exchange can be observed in a home aquarium. From the leaves of the plants you can see bubbles of oxygen rising in the water. The fish breathe in this oxygen and eat the leaves of the plants. The plants use the carbon dioxide breathed out by the fish, and the waste products of the fish supply them with their mineral needs.

Animals and How They Live

BEGIN YOUR study of animals with those nearest to you. If you have pets of your own, study them. Or visit those of your neighbors. Perhaps you can make friends with the owner of an animal store or one of the keepers at a zoo. From men like these you will hear many amusing stories.

You may have the opportunity to raise a baby bird whose parents have been killed. The greedy little creature will keep you busy hunting for worms, but it is a real thrill to make a friend of a wild bird who will fly to your shoulder at your call. Crows are intelligent and amusing. They are thieves, and their mischievous tricks may keep the household in an uproar, but they are great fun.



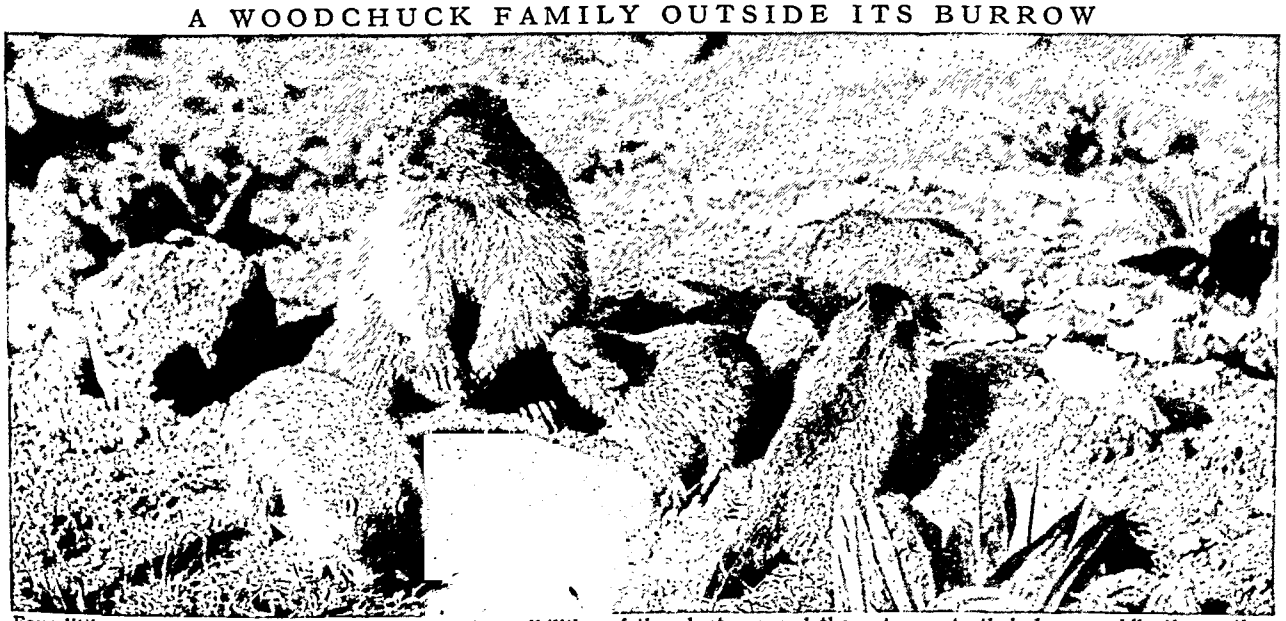
Under the mother's guidance, wild mallard ducklings take to the water almost immediately after they have hatched. When danger threatens, the young scatter and seek cover, while the mother attracts attention to herself by pretending that she is injured.

The things to watch for in animal study are endless. How do they care for their young? Kittens are born blind and helpless. The mother feeds them with her milk for several weeks, keeps them clean, tries to hide them in a safe place. Have you ever noticed how she fusses when you play with her babies? At the first opportunity she carries them off to their bed. She will change their hiding place repeatedly if they are disturbed.

Elephants and bears, who have only one or two young at a time, take care of them for about two years. A mother bear is a great disciplinarian. If her cubs don't behave she boxes their ears. One was observed trying to teach the babies to swim. They preferred to ride across the stream on her back. As fast as she would roll them off, they would scramble back on again. When she finally got them across she gave them both a good sound cuffing.

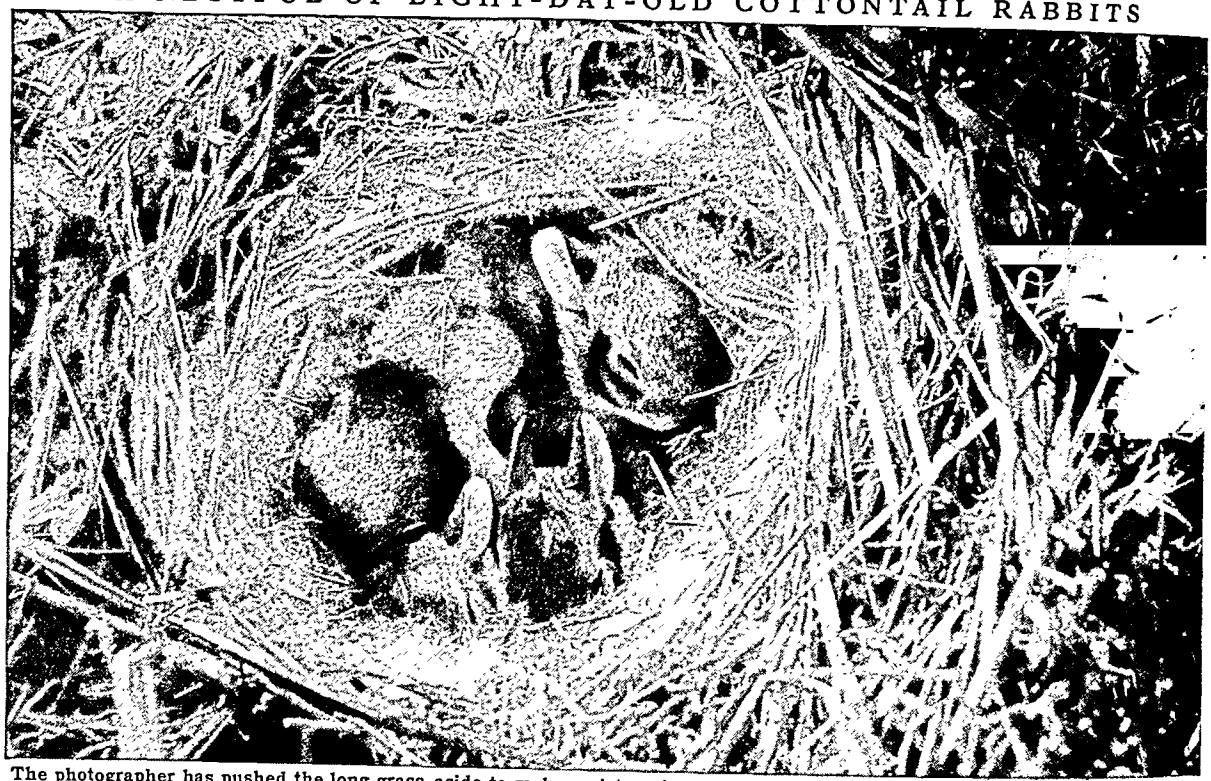
Skunks remain in the nest and feed on their mother's milk for about 20 days. When they are strong enough, they go for walks with the mother to learn how to catch insects, mice, and other food. They march off in single file. If one strays, the watchful mother pushes him back in line.

A WOODCHUCK FAMILY OUTSIDE ITS BURROW



Four little woodchuck cubs investigate the food possibilities of the plants around the entrance to their home, while the mother listens alertly for any unwelcome sounds. At the slightest suspicion of danger she will hustle them into the burrow.

A NESTFUL OF EIGHT-DAY-OLD COTTONTAIL RABBITS



The photographer has pushed the long grass aside to make a picture for us of a nestful of young cottontail rabbits. See how quiet and trustful they are. They need to be well hidden to escape their many enemies. The mother rabbit has hollowed out this spot in thick undergrowth and has lined it with fur taken from her own body. If you came close to the nest without knowing where it was, you would not hear a sound of stirring or a single squeal, no matter how hungry the little ones might be. For they know by instinct that a noise would perhaps attract a passing coyote or mink or weasel.

Many wild babies are able to find their own food a few hours after birth, but they remain with the mother until they are strong enough to protect themselves. You have seen chicks huddle under the hen's wings when a hawk flies overhead.

Some animals provide elaborate homes, others depend on clever concealment for the protection of the babies. The mother rabbit makes a shallow nest of leaves lined with fur plucked from her own breast. She places it in the open, away from trees and shrubs which might hide an enemy. When she goes away from the nest to hunt for her own food she covers it over with dried grasses. The mother deer hides her fawns in thickets near where she is feeding. They lie still and their spotted coats blend into the foliage.

Muskrats, beavers, chipmunks, prairie dogs, and foxes build houses with underground runways and separate exits and entrances. In warm, dry chambers the babies are well protected against their enemies. On sunny days they play out of doors at the entrance to their home, while one of the parents keeps a sharp watch for danger. At a signal they scramble instantly back into the den. Animal babies are obedient, for their lives depend on obedience.

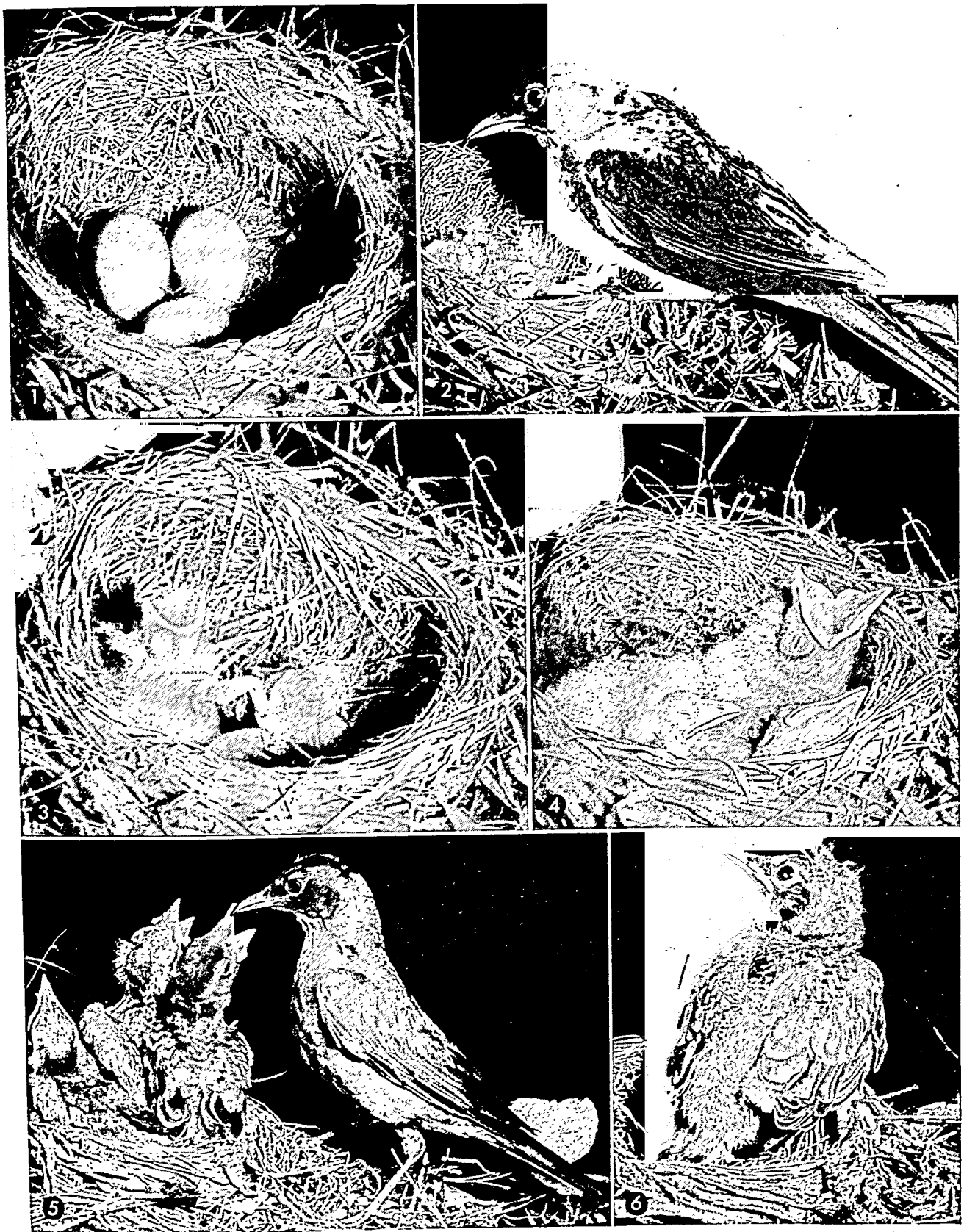
The mother carries her helpless young in many different ways. The raccoon carries her baby by the loose skin of the neck, as a cat does a kitten (*see* Raccoon). The bear holds the entire head of the tiny baby in her mouth. The opossum carries the newborn young in a pouch, as the kangaroo does. When they are older they ride on her back. A polar bear cub seizes its mother's tail and is towed out of danger. Grey Owl,

MOTHER PIG SAVES HER YOUNG FROM DROWNING



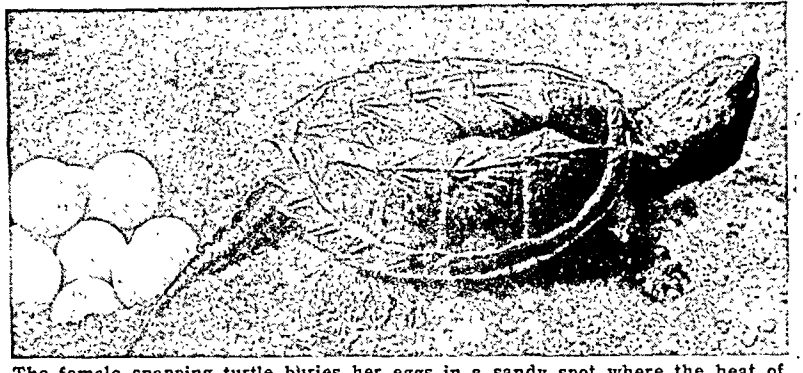
This family has been driven from its farmyard pen by rising flood waters. The sow is steering her eight piglets through the backwaters of the river to safety on higher ground. Although pigs are not fond of swimming, they will do so if their own lives and the lives of their young depend on it.

A FAMILY OF ROBINS GROWS UP



These pictures tell the story of a robin family from the day the greenish-blue eggs were laid (1) until the last fledgling left the nest about four weeks later. Two weeks after the first egg was laid (2) a moist, struggling baby robin pecked its way out of the shell. The eggs hatched at 24-hour intervals, in the order in which they were laid. At first the bird's eyes were greatly enlarged (3). They rapidly assumed a more normal size (4) but remained blind for about a week. Both parents fed worms to the babies (5), the birds opening their bills whenever the nest was touched. When they left the nest their tails were still short, their wing feathers undeveloped, and their coats speckled (6).

THE TURTLE PREPARES TO HIDE HER EGGS



The female snapping turtle buries her eggs in a sandy spot where the heat of the sun can hatch them. She does not stand guard over them; her skill in hiding the traces of the hole is the only protection the eggs receive.

the Canadian naturalist, tells of seeing a young beaver standing upright on its mother's broad flat tail and holding onto the fur of her back with its tiny claws. While it was dragged off to safety it looked around brightly. A squirrel holds the infant in her mouth by its stomach, while the young one curls its head and tail on either side of her face. Baby bats cling to the mother's breast (*see* Bat).

Only rarely do the fathers assume all the household duties. The stickleback, a fish, builds the nest and fiercely guards it until the eggs have hatched. The father sea horse takes the eggs laid by the female into a sort of vest pocket, like a kangaroo's pouch. He not only hatches the eggs in his pocket, but cares for the young until they are strong enough to fend for themselves (*see* Sea Horse).

Most of the insects and fish abandon their eggs before they hatch. Vast numbers of the unprotected young are killed by their enemies. Because of this destruction, an enormous number of eggs must be laid to make sure that a few will escape to carry on the race. Even these primitive mothers are not entirely selfish, for they lay eggs in places most suited to the needs of the young. Blowflies seek out the carcasses of dead animals, for the larvae feed on rotting flesh. Certain wasps place a paralyzed but living insect in the nest, then lay an egg on the insect and close up the nest. When the larva hatches a few days later, it has a supply of fresh food at hand. The eggs of plant-eating insects are always laid on the particular kind of plant which the larvae require for food.

Every animal is provided with some means of defending itself. They fight with claws, teeth, horns, tusks, stings, or quills. Deer and rabbits run away. Many birds, insects, and animals are shielded by protective coloration, which blends so cleverly into their surroundings that they escape notice.

CARRYING THEIR YOUNG





This spider (left) packs her eggs in a silken pouch or bag which she carries about with her until the baby spiders have hatched. The mother opossum (below) is one of the most patient carriers of the animal world. After the newborn young are able to leave her pouch, they ride on her back until they are old enough to take care of themselves, returning to the pouch to sleep and rest. One wonders how she can climb trees with such a load.

The froghopper, a sap-sucking bug, clings to the stem of a plant and covers itself with a white mound of bubbles. Some insects taste so bad that other creatures leave them alone. The whirligig beetle, which lives on top of a pond, has eyes that can see both down and up at the same time. If a bird flies over the pond, it dives. If a hungry fish appears, it flies off.

Cooperation for Safety

Animals that live in colonies, like the beavers and prairie dogs, help to protect one another. Scouts are always on the alert watching for danger. At a signal from a scout the members of the colony scramble to safety in their dens.

Not all of an animal's life is devoted to the serious business of finding food and escaping from enemies. Even the adults find some time for fun. You have all watched kittens and puppies tumble and race, but to see a wild animal at play is a rare treat. Skunks have an odd little dancing circle game in which the entire family joins (*see* Skunk). Otters slide by the hour on mud toboggans. In the winter they coast on the snow and ice with as much delight as any small boy. Admiral Byrd's explorers in the South Polar seas watched penguins coasting into the water down slopes of ice. If a bird at the head of a waiting line was too deliberate, the bird behind gave him an impatient shove. Beaver cubs like to wrestle. With stubby front legs around each other's necks, they tug and roll until they topple over in a grunting heap.

ANIMALS PROTECT THEMSELVES IN MANY WAYS



The common mole (1) stays underground. Notice the big front paws with which it digs. The porcupine (2) defends itself with needle-sharp quills barbed at their tips. The great claws of the lobster (3) seize and hold its food, and the armor plate of shell protects it from attack. The froghopper (4) builds a house of evil-tasting bubbles in which it lives safe from its foes. The insect ejects the waxy fluid from its body and with its tail lashes it into a sticky mass of foam. The peaceful beaver (5) simply retires to the security of its underwater home.

How Plants and Animals Prepare for Winter



Two boys and a dog stroll through the gold and crimson glory of the autumn woods. The insect orchestra has fallen silent. An occasional wiry "screek" tells of a late-journeying bird still feeding on seeds and berries. Few animals remain active.

AS SUMMER draws to a close the watchful nature student will see many signs of approaching winter. The sumach has turned scarlet. The trees are a blaze of red, orange, and yellow. The familiar birds are gone, and new birds are appearing on the lawn in the morning, only to vanish in the night. Soon you may be sitting by a bright fire listening to the snow hiss against the windowpane and wondering how the little people of the field and forest are faring. A few months ago the woods swarmed with life. Now the winter quiet is broken only by the rustling of the weed tops in the wind, the tinkle of the brook under the ice. What has become of the wild things?

Some Run Away; Some Go to Sleep

Some of them have run away from winter (*see* Migration of Animals). Most of the birds fly at night. If you listen carefully you can hear their calls. With your field glasses watch them fly across the face of the full moon.

Some animals escape winter by simply going to sleep and forgetting about it (*see* Hibernation). You will probably never see a hibernating bear in its cave or in a hollow tree, but you can find bats. Look in your attic or high in the eaves of a barn. If there is a cave near your home explore its roof with a flashlight. There you are sure to find bats hanging upside down, sound asleep. When you pick one up it will seem to be dead. It is cold and stiff and hardly breathes. But in a warm room it will begin to stir, stretch its folded wings, and slowly drag open its sleepy eyes. Soon it will be as lively as ever. Many animals sleep only when the weather is very cold and waken on mild winter days to go in search of food.

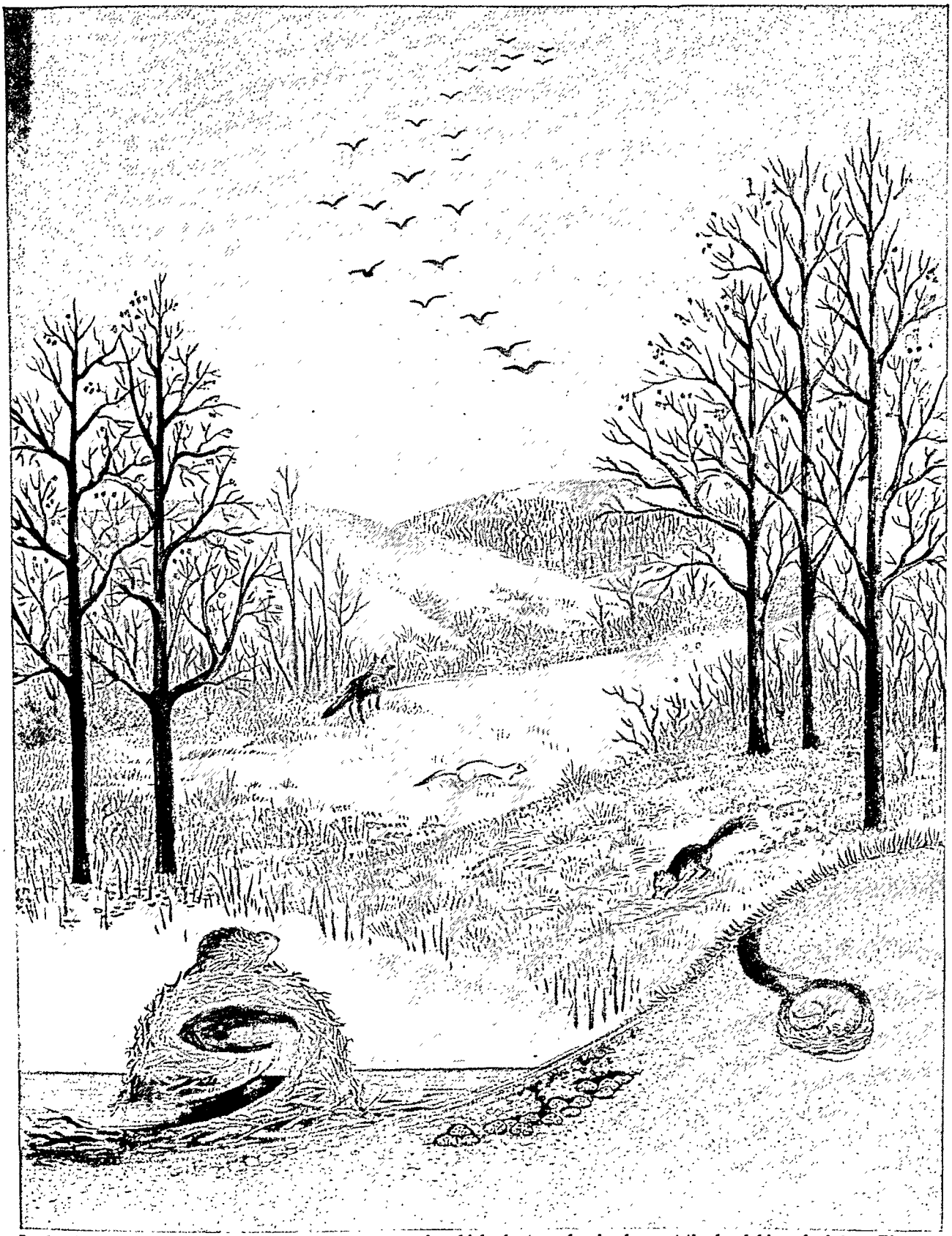
Some Fight Winter with Their Wits

Many animals store away food just as your mother stores onions and potatoes and canned fruits and vegetables. You have all watched squirrels hide nuts. Something tells them that they will need the nuts in the hungry days to come. Beavers cut green logs and twigs and sink them beneath the water at the entrance to their lodges. Chipmunks hide nuts, seeds, and grain in their underground storerooms to be safe from weather and from theft by other animals. Foxes bury food and dig it up when necessary.

Animals that can feed themselves through the winter, like foxes, wolves, and deer, simply put on heavy, shaggy coats and go on living as before. Some, like the weasel, snowshoe rabbit, snowy owl, and ptarmigan, change their brown coats for white. Against the snow it is hard for their enemies to see them.

Among the foods that birds and animals can live on in the winter are bark and mosses, which remain green and nourishing under the snow, various seeds and nuts, dried berries and fruits, and insects and grubs hidden in the bark of trees.

SOME EXAMPLES OF COLD WEATHER "PLANNING"



In the drawing above we see some of the many ways in which plants and animals meet the hardships of winter. The tree drops its leaves. A flock of birds flies to the South. In a snug burrow, well below the frost line, a fat woodchuck sleeps away the months. The squirrel lives on its hoard of nuts. The muskrat retreats into its house of reeds. Frogs, toads, and insects lie buried in the mud below the stream bed. The weasel changes its summer coat of brown for a white coat that makes it hard for its enemies to see it against the snow. The hardy fox, warm in its cold-weather fur, watches for an unwary rabbit.

GREY OWL PLAYING WITH A BEAVER PET



The Canadian Indian naturalist Grey Owl, through his delightful books and articles, showed the importance of protecting the beaver. Here he is seen feeding one of his pets.

Most of the insects die in the fall, but they leave their eggs tucked away in safe places to hatch out in the spring. Many go through the winter rolled up in warm cocoons. Some hide in cracks in trees and buildings, or burrow down into the ground. Houseflies sleep in the walls around windows. On warm days they crawl out lazily to sun themselves. Honeybees seal up the hive and live very comfortably on stored honey. Snails draw into their shells and seal them with a door of slime. Turtles, frogs, and toads bury themselves in mud below the frost line.

OTTER SLIDE



Otters enjoy coasting as much as any small boy or girl.

Plants, like animals, must change their way of living if they are to keep alive during the months when food, moisture, light, and warmth are all reduced below their normal needs.

The life processes of the tree slow down. Its leaves stop manufacturing food, and the sap no longer flows through its limbs. It looks dead, but actually it is only asleep and resting, like a hibernating animal (*see* Leaves).

All the other plants too are getting ready for winter. Some of them die above ground, but their roots below ground remain alive. Many plants die below ground as well as above. Before they die they form seeds which live through the winter. They remind us of the insects that die but leave behind them the eggs which will carry on their kind.

Don't give up picnics and walks in the country just because it is winter. Roasted wieners and hot chocolate never taste better than beside a log fire built in some spot protected against the wind. There is much to see in the winter. The birds are few, but they are unusually interesting. The siskins, redpolls, snow buntings, crossbills, and many others spend the summer in distant northern forests. In the winter they move south in search of food. A feeding tray will bring these rare and beautiful visitors to your window (*see* Birds).

Now is the time to collect birds' nests. Their owners have no further use for them, and they are easily found when the screen of leaves is gone. Examine the materials of which they are made and the skillful way they are woven and attached to the branches. Now too is the time to search for cocoons and chrysalises. Keep them in a cage or box and moisten them with a few drops of water occasionally, for the insects inside will die if they are permitted to dry out.

In the winter you may learn to recognize trees by their shapes, the texture of their bark, and the shape and color of their buds. Make a collection of buds and mount them beside your leaf and seed specimens. Buds are just as distinctive as the leaves which develop out of them.

Even dead weeds are worth studying and collecting. Goldenrod, teasel, and Queen Anne's lace have beautiful patterns. Many are useful, for their seeds are eaten by birds and small animals. Some of the best winter lunch counters are the ragweeds and pigweeds. Try to find out what winter seeds and berries are eaten and what wild things eat them. Tracks in the snow leading to the various plants will tell you which ones are being visited for their food and which for the shelter they provide against the winds. Identifying tracks in the snow is a delightful detective game. The white-footed mouse makes a track which John Burroughs describes as "a sort of fantastic stitch on the coverlid of the snow." This dainty little mouse also carves hidden passages and winding galleries under the snow. You can hear the mice squeak and twitter, but by the time you have dug into their tunnels the fleet little animals have vanished.

SKUNKS AT PLAY



In this odd circle game, they go in toward the center and then back out, over and over again.

The Balance of Nature

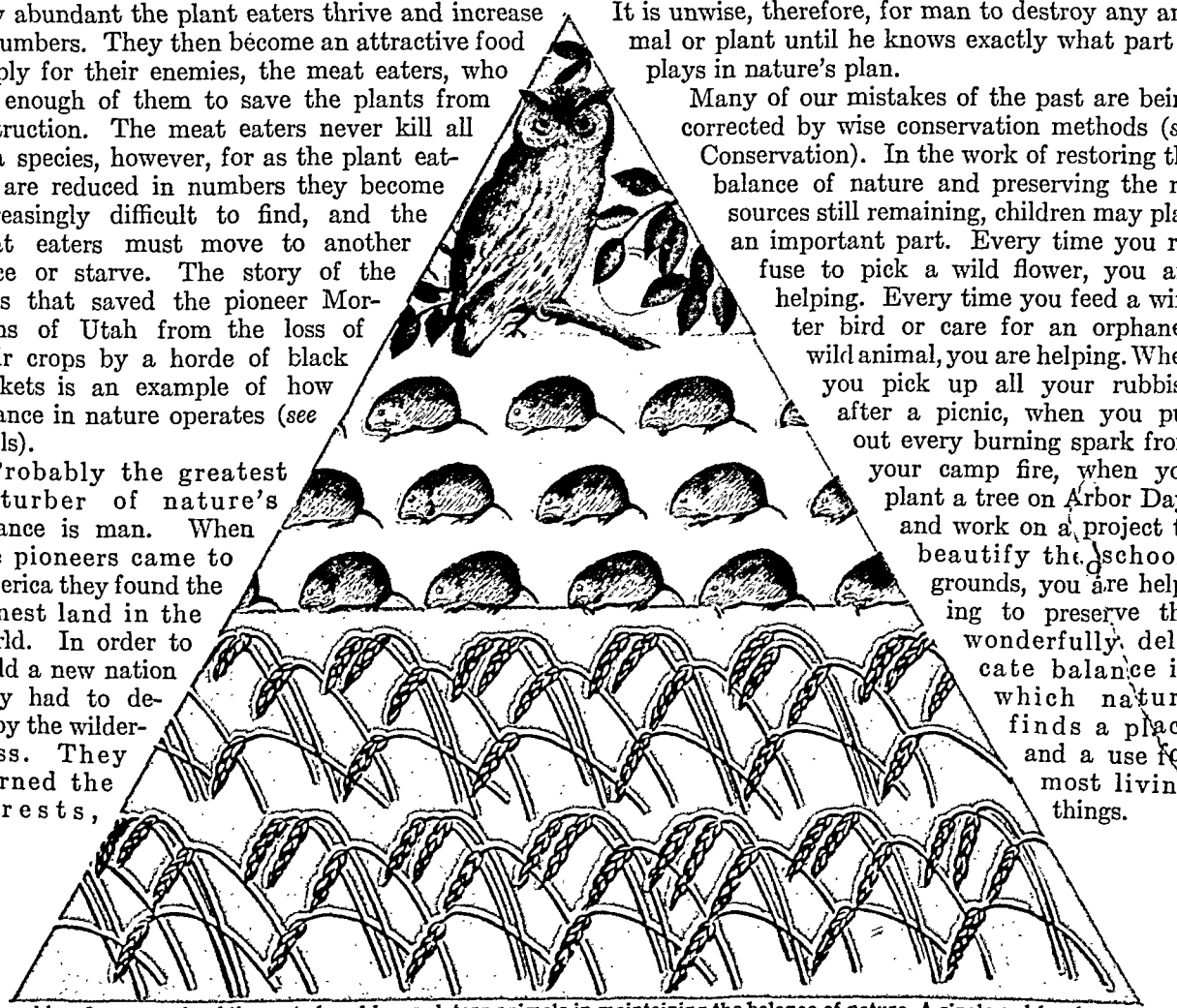
WE HAVE learned that living things are dependent on one another for food and that they must protect themselves against becoming the food of a larger or stronger animal. "Eat or be eaten" is the law in nature.

If nature is undisturbed by man she tends to maintain a balance between the numbers of living creatures and their food supplies. The attacks of enemies are one of her most effective means of preventing a species from multiplying too fast. The children and grandchildren from just one pair of field mice can total a million mice in a single year. The world would soon be overrun at this rate. Fortunately, field mice have many enemies—owls, hawks, weasels, skunks, black snakes, and house cats. All these animals are intent on getting food, and without knowing it they are keeping down the numbers of mice and maintaining the balance of nature. When farmers kill hawks and owls they reduce the enemies of the field mice. The mice multiply and damage the farmer's crops. If the plants in a community become very abundant the plant eaters thrive and increase in numbers. They then become an attractive food supply for their enemies, the meat eaters, who kill enough of them to save the plants from destruction. The meat eaters never kill all of a species, however, for as the plant eaters are reduced in numbers they become increasingly difficult to find, and the meat eaters must move to another place or starve. The story of the gulls that saved the pioneer Mormons of Utah from the loss of their crops by a horde of black crickets is an example of how balance in nature operates (*see* Gulls).

Probably the greatest disturber of nature's balance is man. When the pioneers came to America they found the richest land in the world. In order to build a new nation they had to destroy the wilderness. They burned the forests, drained the swamps, plowed up the prairies, and dumped wastes in the rivers. The results were disastrous and far-reaching (*see* Birds, subhead "Protecting and Conserving Our Birds"; Ecology). Many of the consequences were impossible to foresee. The very act of planting a crop disturbs nature. Our greatest insect pests thrive because man has provided them with an abundant food supply, and so we have to wage bitter warfare with destructive enemies that were unknown to the Indian.

When we kill predatory animals to protect our livestock and poultry, we create new problems. In the West the ranchers have almost wiped out the mountain lion and greatly reduced the numbers of coyote. As a result the deer have enormously increased. Deer hunting is encouraged in season to save the forests from destruction by overgrazing. In one place the deer ate all the vegetation along the banks of a trout stream. With the plants gone, mud washed into the stream and killed the trout. No one anticipated that killing mountain lions would ruin trout fishing. It is unwise, therefore, for man to destroy any animal or plant until he knows exactly what part it plays in nature's plan.

Many of our mistakes of the past are being corrected by wise conservation methods (*see* Conservation). In the work of restoring the balance of nature and preserving the resources still remaining, children may play an important part. Every time you refuse to pick a wild flower, you are helping. Every time you feed a winter bird or care for an orphaned wild animal, you are helping. When you pick up all your rubbish after a picnic, when you put out every burning spark from your camp fire, when you plant a tree on Arbor Day, and work on a project to beautify the schoolgrounds, you are helping to preserve the wonderfully delicate balance in which nature finds a place and a use for most living things.



The owl is a fine example of the part played by predatory animals in maintaining the balance of nature. A single owl has been known to eat ten field mice at one sitting, and four hours later he was ready for a second meal. One mouse eats an estimated 24 to 36 pounds of green field crops in the course of a year. At a single meal, therefore, one owl saves the farmer from 240 to 360 pounds of vegetation. A thousand mice in a field would consume at least 12 tons of food in a year.

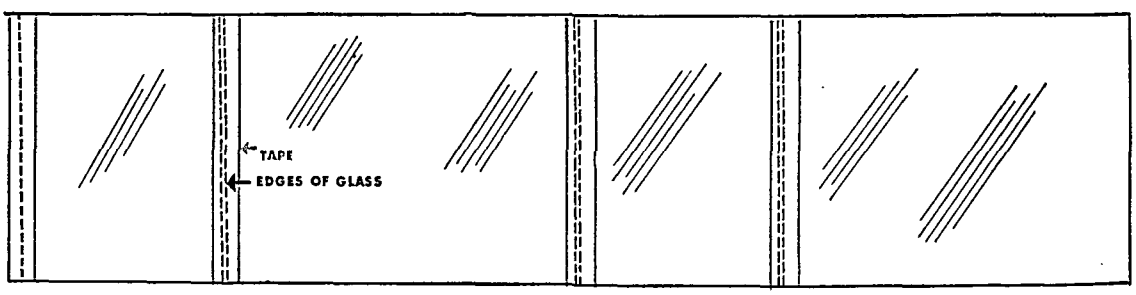
How to Study Nature in Your Own Home

THE STRANGE affairs of wild things are enormously interesting, yet seldom observed by busy humans. Many people have no chance to study living animals in forest, meadow, pond, and stream. By providing them with the proper cages and food, however, we can persuade them to carry on their normal lives in captivity, where we can watch them closely day by day. A home "zoo" of fish, insects, and other small land and water animals can be great fun.

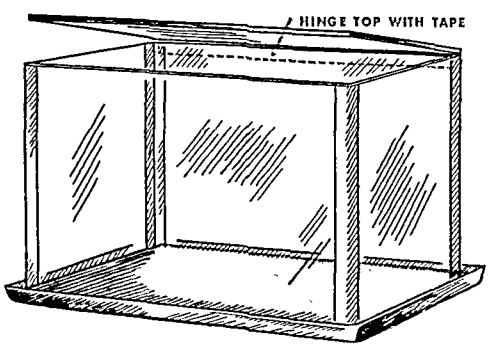
The *terrarium* is a glass-sided box with a movable lid, which houses land and amphibious animals or insects in their natural plant surroundings. Snakes, toads, frogs, chameleons, lizards, newts, salamanders, snails, and turtles may be guests of the terrarium. You won't, of course, attempt to raise snakes and toads in the same box, or insects with insect-eating animals. You will determine which animals live together peaceably.

The terrarium may vary in size from a mason jar containing a few water plants and insect larvae to a furniture packing case housing a black snake. Terrariums three or four feet in length permit such plant associations as woodland, bog, desert, or meadow, with their appropriate small animal life. The drawings below show how to build a small box and how to prepare the various foundations.

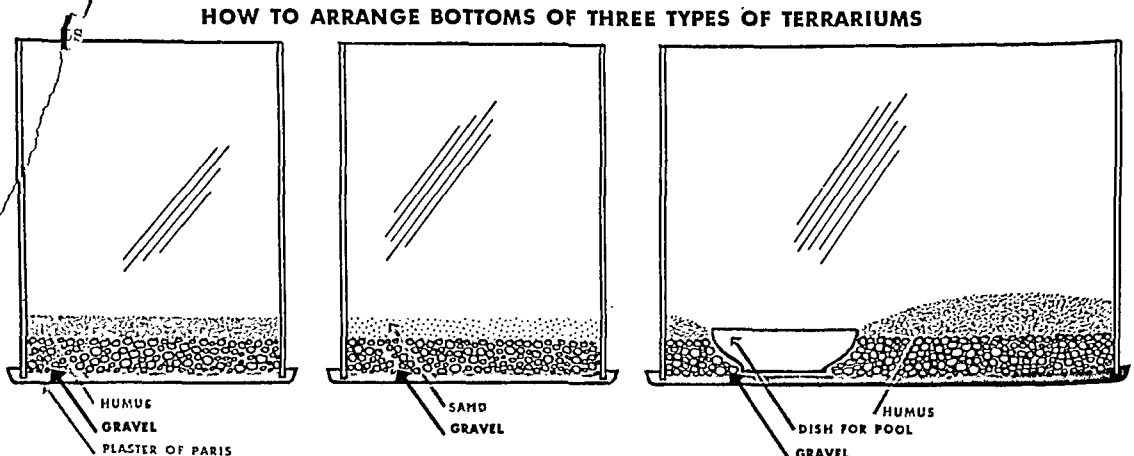
HOW TO MAKE A TERRARIUM



A straight-sided glass tank makes the best terrarium. It is easier to plant than a round bowl, and it does not give a distorted view of the contents. It is preferable to a wire-screened box because it keeps out cold drafts and maintains a fairly even temperature—important factors in the well-being of many animals. The size depends on the nature and number of its guests. A satisfactory small tank may measure 12 inches high by 18 inches long and 13 inches wide. Tape together the edges of four pieces of window glass, as shown in the illustration above. Set the glass in fresh plaster of Paris in a baking pan, photographic developing tray, or similar metal container of the desired size. Paint or shellac the tape to protect it from moisture. Aquarium cement on the inside joints will make them waterproof. A hinged lid completes the box. The bases for different types of terrariums are shown below.



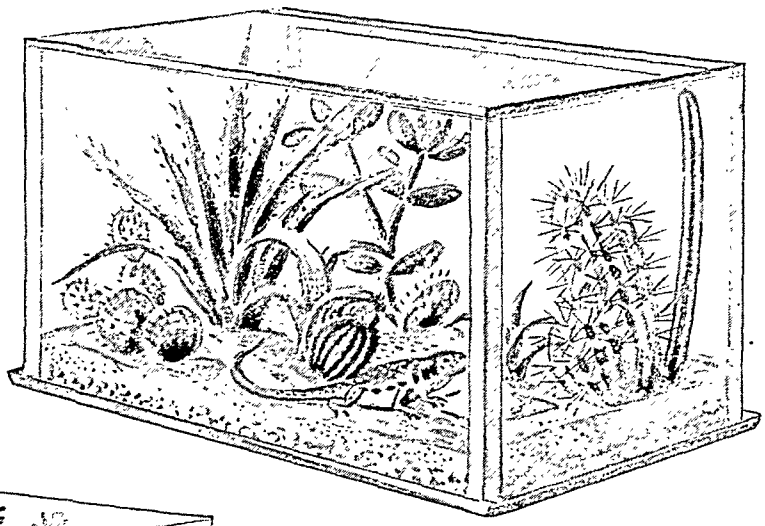
HOW TO ARRANGE BOTTOMS OF THREE TYPES OF TERRARIUMS



The gravel base serves as a drain which removes surplus moisture from the top soil and prevents it from becoming soggy. The gravel should be well washed to get rid of impurities before it is put into the box. For a woodland garden add one or two inches of rich humus. A bog garden requires acid soil found around swamps and peat bogs. In the desert terrarium cover the drainage base with three or four inches of sandy potting mixture, which you can usually get from any greenhouse.

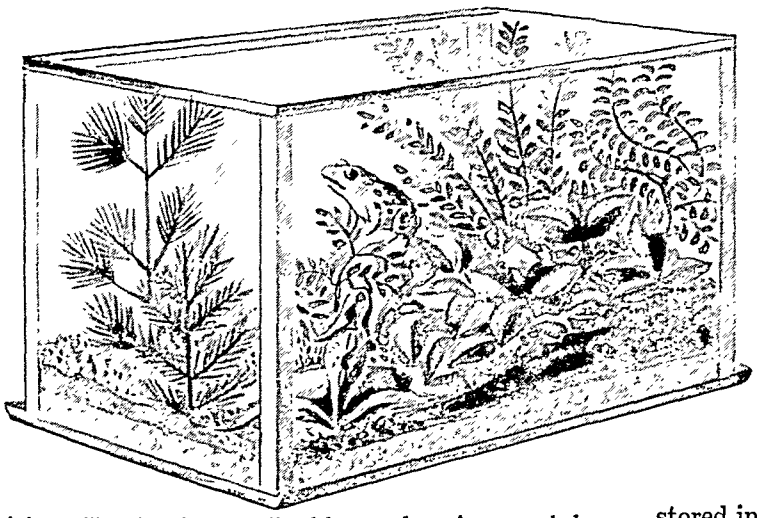
Plan the contour of your garden when you put in the base. Hills and valleys are more interesting than a flat surface. Lichen-covered rocks lend variety to the "landscape" and provide resting and sunning places for some animals and hiding places for others. A mossy tree branch at one side of the box will be used by snakes and lizards. And a small pool is welcomed even by desert animals.

PLAN FOR A DESERT TERRARIUM



The desert terrarium (above) may house a horned toad, collared lizard, desert tortoise, or snake. Buy potted plants from a florist and sink them, pot and all, into the sand. Small cacti, aloes, sedums, crassulas, stapelias, and the crown of thorns may be used. These desert plants and animals will require a warm, sunny, dry location.

A WOODLAND BOG GARDEN



A frog will delight in a woodland bog garden. An enameled pan or glass dish sunk in the soil makes a pool. Pebbles and tiny water plants add interest, and a flat stone should be provided on which the frog may sun himself. Ferns, club mosses, ebony spleenwort, evergreen, laurel and blueberry seedlings, and small woodland flowers are all attractive plantings for the bog garden.

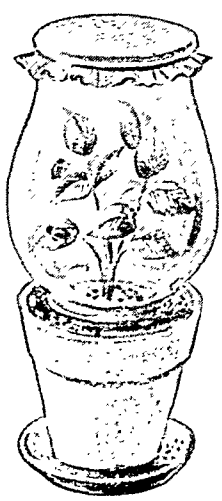
The plants in the box may include ferns; club mosses; evergreen seedlings, such as white pine, cedar, spruce, and hemlock; and small flowering species, such as wood sorrel, violets, and bluets. In the bog garden add a pitcher plant or sundew, surrounded by sphagnum moss. The desert garden may be stocked with potted plants from a florist.

How to Care for the Terrarium

Keep the gravel bottom layer of the box moist, but don't let the top layer become soggy. Use pond or rain water if possible. The amount of moisture can be controlled with the lid. If you want a warm, damp bog garden, open the lid only a crack. If you want a dry "desert" atmosphere, open the lid wide or remove it. The terrarium as a rule should receive only an hour or two of direct sunlight daily. Temperatures of 60° to 75° F. are preferable.

Feeding the animals is the greatest problem in maintaining a terrarium. One should of course carefully study the habits of the creature he proposes to care for in captivity and provide it with natural foods as far as possible. Earthworms are the most useful all-round food, for many animals who are accustomed to other insects will accept a wriggling piece of worm. They can be collected in large numbers after a rain and stored in the basement in a box of moist soil covered with well-decayed leaves. If they are fed bits of chopped beef suet and hard-boiled egg they will survive indefinitely. Lizards, frogs, toads, and salamanders may be induced to eat raw chopped beef or liver if it is moved in front of them on the end of a toothpick or straw. Some insect exterminators sell live insects for use in terrariums and aquariums. Your walks in the woods will become more interesting if you have a hungry toad or chameleon at home demanding that you return with a jar full of food. A net, a covered jar, and a flashlight for night hunting are the only equipment necessary. In capturing the insects you will learn much about them, and many of them you will want to keep in their own terrarium for further study. A simple insect cage is shown at the right.

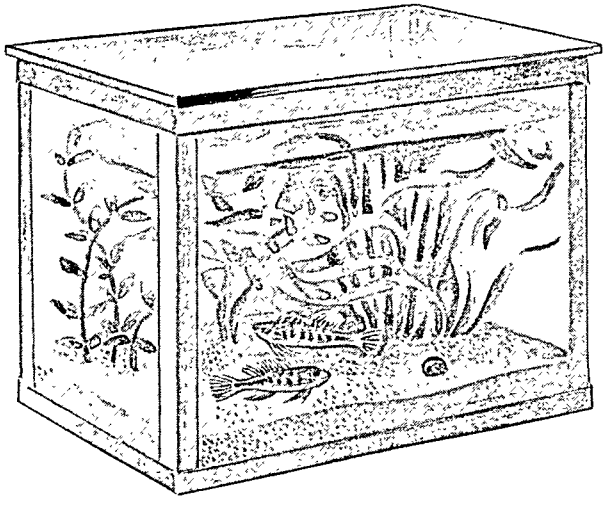
AN INSECT CAGE



Insects and caterpillars will live in a cage made out of a flowerpot and a lamp chimney covered with gauze to prevent them from flying or crawling out. A jar of water sunk into the pot holds fresh foliage where the insects may feed and find shelter.

How to Manage a Balanced Aquarium

A WELL-PLANNED AQUARIUM



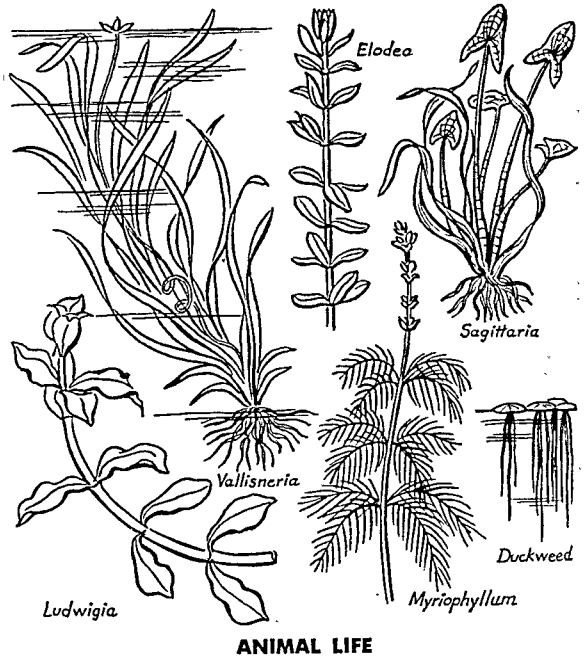
Use a combination of the plants and fish shown at the right. A well-balanced aquarium can maintain itself for long periods with no further attention than the addition of a little water from time to time to replace the amount which has evaporated.

A BALANCED aquarium shows clearly how plants and animals depend on one another (*see* Aquarium). The best aquarium is a rectangular glass tank with metal frame and slate or metal bottom. The round fish bowl gives a distorted view; it does not expose enough water surface to the air; and it cannot be properly stocked with plants.

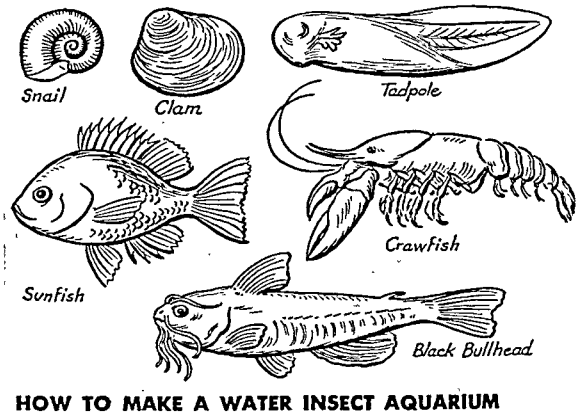
A good aquarium plant is one which produces a plentiful supply of oxygen. Among the best are Elodea, Myriophyllum, Vallisneria, Sagittaria, and Ludwigia. Plants also provide food for various species of water life and protection for eggs and young fry. Over the bottom of the tank spread an inch-deep layer of rich soil, covered with one or two inches of clean fine gravel and sand. Set the plants in this foundation, after planning carefully their artistic arrangement. Add clear pond water and let the tank stand for a week before putting the fish into it.

Native fishes taken from ponds and lakes thrive in the aquarium, but not those from cool, running streams or rapids. If the gill-breathing animals come to the surface and gasp for air, there are too many fish and not enough plants. If the glass sides and the water become green, the aquarium needs more snails to eat the algae. Gray scum or fungus growths indicate decaying material in the water and call for more snails as scavengers. Snails are entertaining and beautiful. The red ram's-horns are like pink rose petals. Their method of cleaning algae from the glass by means of their file-like radula or tongue is fascinating to watch through a magnifying glass. They lay their eggs on the glass sides of the tank, and the embryo snails can be watched as they develop within the transparent jelly. Clams live on microscopic organisms and help to keep the water in the aquarium clean.

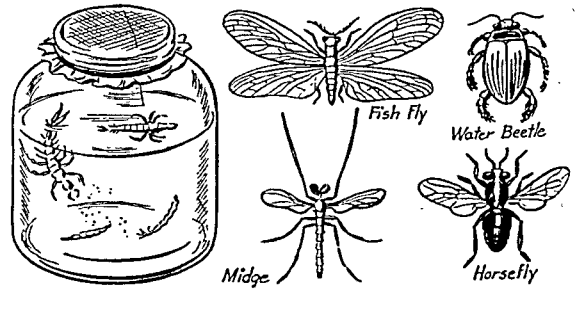
WATER PLANTS



ANIMAL LIFE



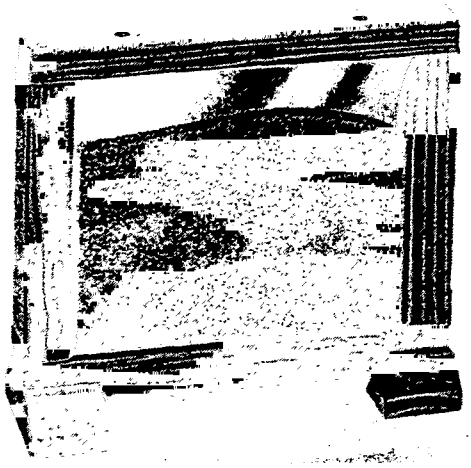
HOW TO MAKE A WATER INSECT AQUARIUM

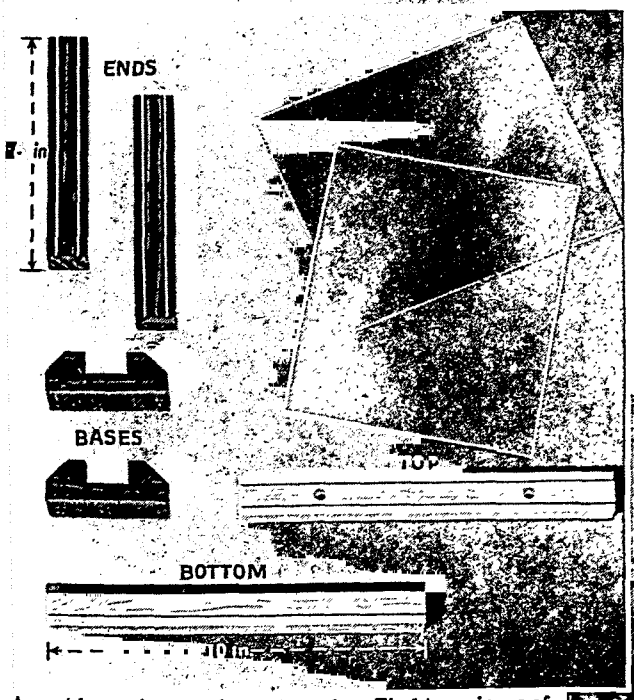


The plants shown at the top are recommended for the balanced aquarium because they give off plenty of oxygen. Such common native fish as the black bullhead and the sunfish (center) may be raised successfully. Snails, tadpoles, crawfish, and clams are interesting additions. In an insect aquarium (below) one may watch water beetles and the larvae of other species. A few are suggested. Put a layer of sand in a tumbler or mason jar, plant a branch of Elodea in it, fill the container with pond water, and let it settle before putting in the insects.

Ways of Watching Ants and Bees

HOW TO BUILD AN ANT HOUSE





An ant house is very simple to make. Find two pieces of photographic plate glass or thin window glass, about 10 inches wide by 6 inches high. In each of the four pieces of the frame cut two grooves with a circular saw. The glass fits into these grooves. In the top bar of the frame bore two round holes. These are the food and water openings, and are kept plugged with bits of sponge. Tape the corners of the glass "sandwich" to hold it together and set it in the bases. Then fill it about two-thirds full with earth found near an anthill.

NOTHING in nature is more fascinating to watch than the family affairs of an ant colony. The endless toil of the workers as they clean and feed the queen, forage for supplies, and tidy the nest; the care of the nursemaids for the eggs and larvae; the spinning of the cocoons and appearance of the young ants—all these and many other interesting activities may be observed in a properly built ant house.

The type of house shown above is one of the most successful. If black paper shields are made for the sides, the ants will burrow down along the glass, and when the shields are removed you can see them clearly working in their tunnels and underground chambers. Between times the paper shields should be replaced or the ants will try to shut out the light with earth.

Collecting the Ant Colony

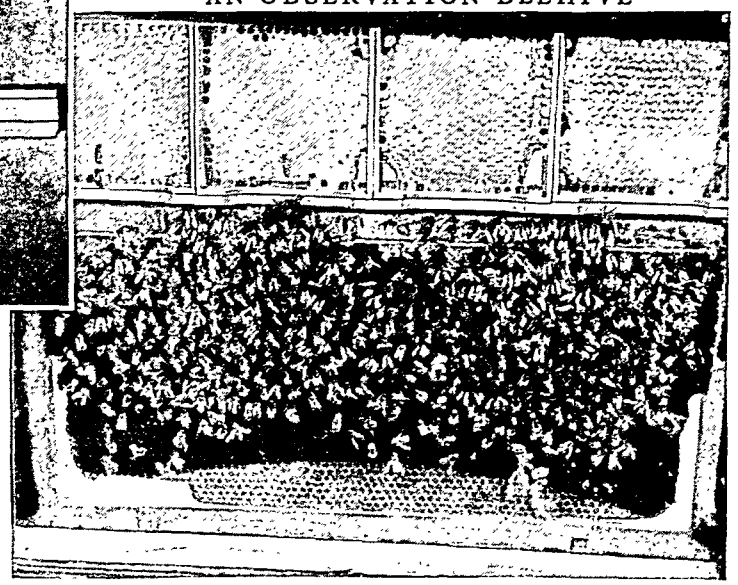
Ant colonies may be found under logs, stones, and debris in practically every backyard, pasture, and wood lot. The best time of year to go hunting is from late July to early September, when the winged males and females are present in the nests as well as the common workers. Be sure to capture the queen, for the colony will not work without her inspiration. You can recognize her by her large size. Try to get eggs, larvae, pupae, and parasites such as aphids.

Take the ants home in a jar and transfer them to the box. Then place it in a dark closet for about a week and *do not disturb it*. The ants will need to recover from their violent house-moving. They are easily excited and one should avoid jarring the nest at any time. Unless you are careful you will be unable to watch their normal behavior.

Feeding the colony is very simple. Into the food opening drop bits of ground beef, dead insects, bread crumbs, and watered honey. Keep the sponge in the water hole moist. Ants must have moisture.

An observation beehive must be purchased from a bee supply house. No amateur should attempt to capture these well-armed insects. The hive stands on the window sill with one side open to the outdoors and requires no attention. Many of the activities go on inside the cells where they cannot be seen, but you may watch the building of the cells, the feeding and development of the larvae, the storage of honey, perhaps even some of the duties of the queen. The hive may be brought indoors during the winter and its inmates fed with water and honey.

AN OBSERVATION BEEHIVE



This observation beehive stands on a window sill with one side open to the outdoors so that the bees may fly about freely. It is provided with frames for the storage of honey. The lower frame is the brood chamber.

REFERENCE-OUTLINE FOR NATURE STUDY

HOW PLANTS AND ANIMALS DEPEND ON ONE ANOTHER

I. How plants depend on other plants
- A. Plant partnerships: bacteria and legumes P-297, A-151, B-13, N-240; algae and fungi L-220, P-80
- B. Nongreen plants which live on green plants: fungi F-316; mildews and molds M-247; mushrooms M-455; rusts and smuts R-297
- C. Decayed and rotting plant life enriches soil S-228
- D. Reaching the sunlight by climbing other plants A-111: ivy I-284; orchid O-406; Spanish moss, color picture P-291
- E. Parasites P-80: dodder, pictures P-294; mistletoe M-326

II. How plants depend on animals N-52, 66
- A. Insects pollinate plants F-185, B-93, O-406, Y-345
- B. Birds and animals scatter seeds S-96: birds B-158
- C. Earthworms plow soil E-197
- D. Birds destroy insect enemies of plants B-158, G-230
- E. Wastes and decayed animal matter enrich soil S-228
- F. Some plants "eat" animals P-297: bladderwort, picture P-295; pitcher plants P-274, pictures P-295, N-51; sundew S-454; Venus's flytrap V-448

III. How animals depend on plants N-52, 66
- A. Food: birds B-188; cattle C-145; deer D-44; insects I-153
- B. Shelter
  1. Holes in trees: chickadee C-238; nuthatch N-316; opossum O-399; owl O-430; raccoon R-19; squirrel S-359*a*; woodpecker W-188
  2. Plant material used in building nest, den, or burrow: birds B-171, 188; insects I-158; bear B-85-6; beaver B-90; muskrat M-473; skunk S-193

IV. How animals depend on animals
- A. Food: Orders Carnivora ("flesh eaters") and Insectivora ("insect eaters"). See the Reference-Outline for Zoology
- B. Social colonies: ant A-253; bee B-93; wasp W-49
- C. Parasites P-77

V. How man depends on plants and animals P-301, F-236, pictures P-288, I-153. See also the Reference-Outlines for Botany, section "Economic Botany—Uses of Plants"; Agriculture, section "Livestock and Livestock Products"; and Zoology, section "Importance of Animals to Man"

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- A. Grow them in garden and window box P-300, G-12
- B. Make experiments to observe their life processes P-297
- C. Special books tell how to collect, mount, and identify plant specimens B-265, H-394, N-68*b*-69: herbarium F-181

II. How plants get their food P-290-5
- A. Green plants P-293, B-148, N-46
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  3. Stems P-292, T-178
  4. Mineral needs S-228, F-55, M-267, P-293, 294, 295
- B. Nongreen plants P-288-9, P-80, N-50: fungi F-316; mildews and molds M-247; mushrooms M-455; rusts and smuts R-297
- C. Special ways for getting and digesting food
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  2. Plants that get food from others (parasites): mistletoe M-326; dodder, picture P-294
  3. Plants that live in air (epiphytes) A-111, picture P-291: orchid O-406
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- B. Spores S-355-6: ferns F-53-4; liverworts L-279; moss M-404-5; puffball, picture P-297
- C. Bulbs, tubers, and rootstocks: B-348, pictures P-297

IV. How seeds are scattered S-96, B-158, W-66, N-48, pictures S-97, N-49
- A. Seeds with filmy sails: dandelion D-14*n*; milkweed M-254
- B. Seeds with stiff, gliding sails: ash A-401; elm E-336; hemlock H-332; maple M-82; pine, picture P-258
- C. Seeds that steal rides from animals
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- D. Seeds that man uses S-96: fruits F-303-6, color pictures F-307-12; nuts N-316-17
- E. Seeds with water wings W-66
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- B. Plants that live in the desert, color picture P-290. See also in Fact-Index Deserts, *subhead* vegetation
- C. Plants that live in the air A-111: orchid O-406
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- C. Thorns and nettles P-297, picture P-299: cactus C-9; hawthorn H-294; thistle T-120. For nettles, see Nettle in Fact-Index

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3. Holding prey: alligator A-171;
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NATURE HOBBIES FOR OLDER CHILDREN

Nature Study may be broadly interpreted to include all the natural sciences, such as astronomy, biology, mineralogy, geology, and climatology, and such related activities as photography and microscopy. Some nature hobbies for the older student with suggested bibliographies are outlined below:

I. Bird study B-159, 187
—Books to read B-196, H-393, N-68*b*-69, Z-365

II. Insect study I-160*b*. See also in Fact-Index Insect pests; Insects; and Insects, beneficial
—Books to read H-394, N-68*b*-69, Z-365

III. Reptiles and amphibians R-110: frog F-299; toad T-140; salamander S-25; lizard L-281; snake S-205; tortoise T-158; turtle T-222; how to build a terrarium N-64
—Books to read H-393, N-68*b*-69, Z-365

IV. Fish and fishing F-99, F-118
—Books to read H-392, Z-365, F-118*h*

V. The seashore: collecting shells S-141
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VI. Nature photography P-211
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VII. The story of the sky A-427: learning to recognize the stars C-457, S-370
A. North and south polar constellations, charts S-374, 375: mythological associations, charts S-380, 381
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VIII. Collecting minerals and fossils M-261, F-243: how fossils tell geologic time G-52
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IX. Microscopy M-232-6
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B. Books to read H-396

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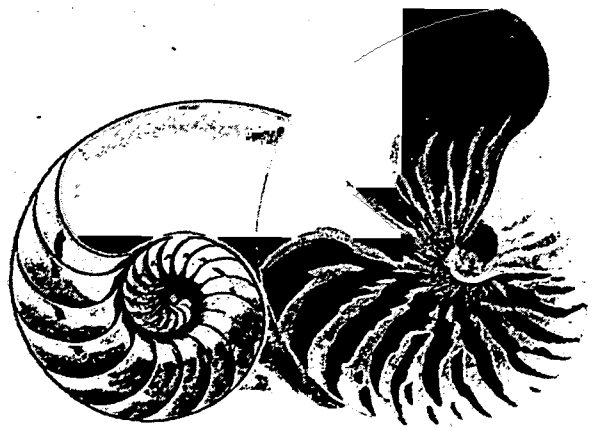
Among the many periodicals and leaflets which contain valuable material on Nature Study are: *American Wildlife, Audubon Magazine, Cornell Rural School Leaflets, Fauna* (The Zoological Society of Philadelphia), *Frontiers* (The Academy of Natural Sciences of Philadelphia), *Junior Natural History Magazine, School Nature League Bulletin* (National Association of Audubon Societies).

(*See also* bibliographies for **Animals, Astronomy, Biology, Birds, Botany, Hobbies, Insects, and Zoology.**)

NAU'TILUS. References to the nautilus abound in literature, but few persons know anything definite about this curious sea animal. The pearly nautilus is a mollusk of the group called cephalopods. This group also contains the octopus and squid (*see* Mollusks; Octopus). The pearly nautilus lives in the warm seas surrounding the East Indies and the Fiji Islands. Its large, cream-colored shell is beautifully streaked with brown on the outside and divided inside into a number of chambers lined with mother-of-pearl. This beautiful iridescent lining gives the pearly nautilus its name.

The young nautilus at first lives in a nearly cylindrical shell. As the animal grows, a new chamber is secreted and a partition made between this and the old one. The nautilus slips forward into the new chamber, leaving behind it only a narrow cord, the *siphuncle.* This is formed from the structure called the *mantle,* which all mollusks have. A large number of chambers are formed in the same way, the animal moving forward each time, until a stage is reached when no new chambers form. All the chambers are air-tight

HOW THE CHAMBERS ARE ARRANGED



This nautilus shell has been split lengthways. In front, on the right, is the cream and brown exterior. At left is the interior of the shell, with its curious chambered structure.

cavities filled with a gas rich in nitrogen. The siphuncle extends through all the chambers into the first one formed. The living animal does not ordi-

THE NAUTILUS IN ITS SHELL



Part of the nautilus' shell has been cut away to show how the animal is folded up upon itself in the front compartment of the shell. The tentacles are used for catching food.

narily rise to the surface, but the shell is often found floating after its occupant dies. The gas-filled chambers serve during the life of the animal to make its shell lighter and easier to carry about.

The odd life history of the pearly nautilus was what prompted Oliver Wendell Holmes to write 'The Chambered Nautilus', containing the famous stanza:

> Year after year beheld the silent toil
> That spread his lustrous coil;
> Still, as the spiral grew,
> He left the past year's dwelling for the new,
> Stole with soft step its shining archway through,
> Built up its idle door,
> Stretched in his last-found home, and knew the
> old no more.

The nautilus swims by forcing water from a siphon, just as the octopus and squid do. The natural position of the animal is with the head downward and the shell vertical. Nearly a hundred small tentacles, with which food is caught, surround the mouth. None of these have suckers. Each can be withdrawn into a sheath. When the tentacles are expanded, the head of the animal looks like the open disk of a sea anemone.

One of the most remarkable features of the nautilus is its eye, which is constructed on the principle of the pin-hole camera. No other animal has a similar type of eye. The eyes are rounded hollow boxes about a half inch in diameter. They are opaque, but in the center of each is a tiny hole that allows sea water to enter and fill the eye. There is no lens.

The *pearly nautilus* is often confused in literature with its distant relative the *argonaut*, or paper nautilus. This animal is found in warm seas around the world. The female secretes a thin, scalloped shell in which she deposits her eggs. The ancient Greeks thought that the creature used its shell as a boat and its arms as sails. (For picture of paper-nautilus shell in color, *see* Shell.)

WHERE *the* NAVY TRAINS *Its* OFFICERS

NAVAL ACADEMY, UNITED STATES. The original training school for officers of the United States Navy is the famous Naval Academy at Annapolis, Md. The Academy was formally opened in 1845 according to plans of George Bancroft, secretary of the navy under President Polk. It is supervised by the Bureau of Naval Personnel of the Navy Department.

"June week" is the traditional graduation time at the Academy on the Severn River. From a position in the center of the quadrangle, the visitor sees midshipmen everywhere. Many of them, in the regular uniform of navy blue, are hurrying to the farewell "hop" in the vast gymnasium to the left of Bancroft Hall. Others stroll along the Severn River docks to the left, where the masts of many little sailboats bristle. The administration building lies to the right as does the chapel, where John Paul Jones is buried. Behind are the academic and the marine-engineering buildings.

Midshipman life, with its combination of academic and military studies, is far more strenuous than that of any other college in the country except West Point. Rising at 6:15 A.M. with the *reveille* gun, midshipmen have 30 minutes to dress, form in ranks, and stand inspection. After breakfast they must clean up their rooms. They attend a full schedule of alternate study



The two midshipmen at the left are taking noon sights of the sun with sextants while a third midshipman assists them by acting as quartermaster. All are on a summer training cruise.

RULES FOR MIDSHIPMEN

A superintendent of the Naval Academy drew up the following rules designed to meet the needs of young men in the naval service:

Do your day's work every day.
Strive to make 100 per cent in everything you undertake.
Obey orders cheerfully, honestly, and conscientiously.
Do your full duty on time, all the time.
Practice self-control and self-denial.
Be considerate of others. Be helpful and cheerful and courteous.
Don't be a "growler" or a "sea-lawyer" or a "drifter" or a "dud."
Be true to yourself, to your messmates, to your task.
Be true to the great naval service to which it is your priceless privilege to belong.
Always steer a straight course and answer with a cheerful "aye, aye, sir!"
Be a man and never say die.

and class periods during the day and engage in drill and sports later in the afternoon. After dinner they study, with *taps* and *lights out* at 10:00 P.M.

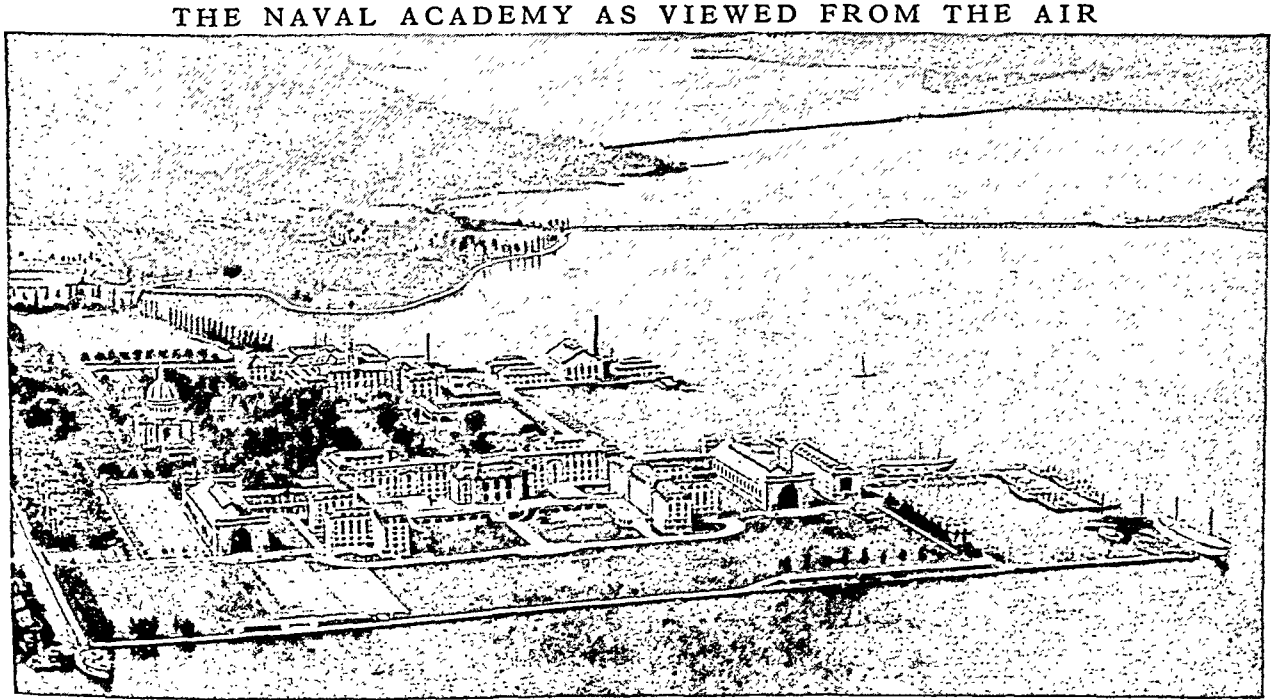
In their first year at the Academy fourth classmen, or "plebes," start the rigid training in infantry drill, rifle range, watch duties, seamanship, parades, and sports. This continues throughout the four years. All four classes receive instruction in 11 main departments—leadership; seamanship and navigation; ordnance and gunnery; marine engineering; aviation; mathematics; electrical engineering; history, government, and English language; foreign languages; hygiene; and physical training. Beginning in their second year, as third classmen, or "youngsters," they go to sea each summer for a three-month practice cruise.

The four-year course may be shortened in time of emergency. Graduates receive the bachelor of science degree in electrical engineering. Most of them are commissioned in the United States Navy. Some become second lieutenants in the Marine Corps.

Most candidates for the Naval Academy are appointed by senators, representatives, and delegates to Congress. Each may appoint 5. The vice-president also appoints 5. The president appoints 5 from the District of Columbia; 75 from the country at large; 40 from sons of veterans killed or injured in service; an undetermined number of sons of winners of the Congressional Medal of Honor; one from Puerto Rico; 4 from the Philippines; and 20 from Latin America and Canada. The resident commissioner nominates 5 from Puerto Rico. The secretary of the Navy appoints 320 men from the Navy, Marine Corps, and their reserve forces; 20 honor graduates from certain schools; and one from the Canal Zone. Candidates must be from 17 to 21 years old (reserve veterans may be 23 years old). Midshipmen are paid $936 a year for expenses. The total number of midshipmen averages about 3,500.

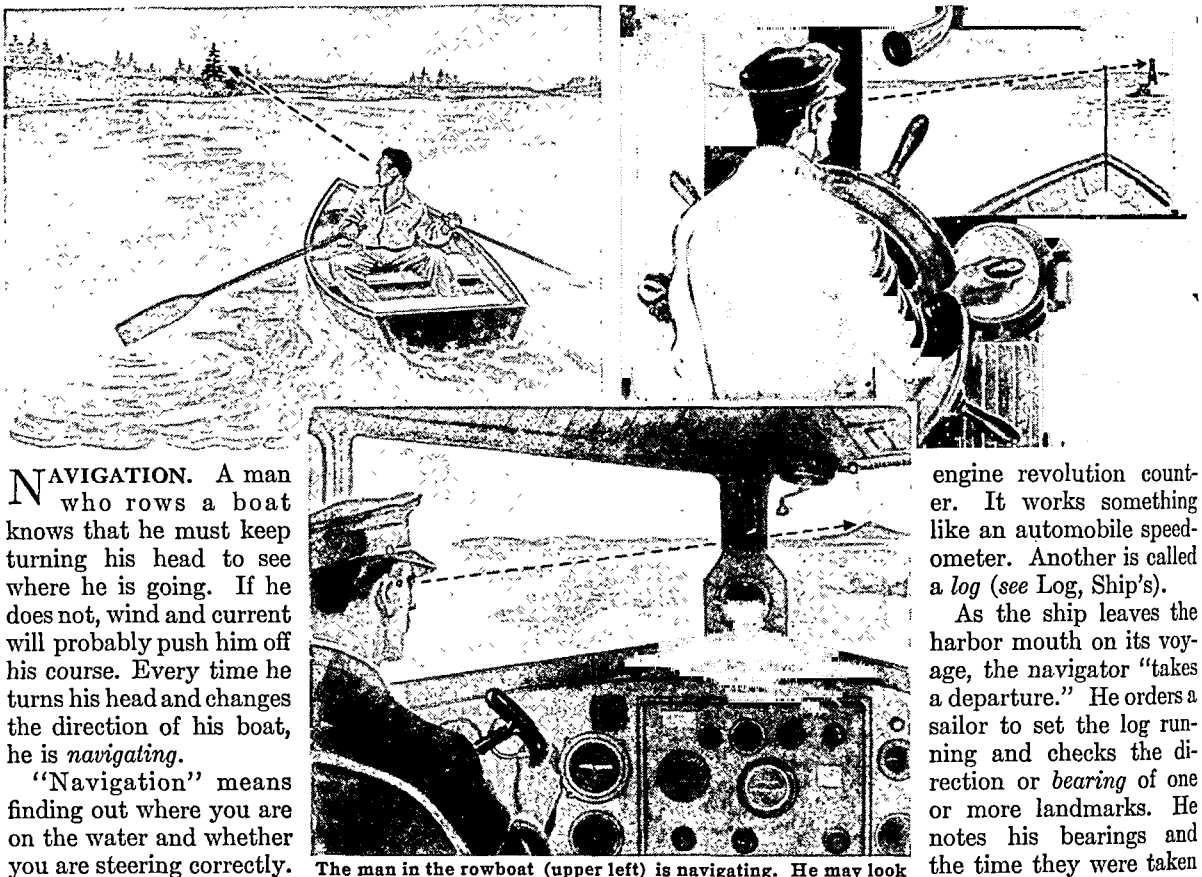
Candidates for admission to the Academy must meet the school's scholastic requirements. Congressional candidates and candidates who are sons of holders of the Congressional Medal may do so with an acceptable high-school record and passage of an examination in mathematics and physics. Certain college work may be substituted for the examination. All other candidates must take the regular entrance examination in mathematics, English, United States history, and physics. Many members of Congress make their initial selection of candidates by competitive examinations.

THE NAVAL ACADEMY AS VIEWED FROM THE AIR



The airplane camera took this view of the United States Naval Academy at Annapolis, Md. Bancroft Hall, in the foreground, is the midshipmen's living quarters, flanked by the armory and the gymnasium. The building with the dome is the chapel. The central structure in back is the academic building, with the chemistry and marine-engineering buildings on either side.

How Men NAVIGATE *over* SEAS *and in the* AIR



The man in the rowboat (upper left) is navigating. He may look ahead now and then to be sure he is going right. Or he may get on his course, then notice a tree or other landmark that lies squarely astern. Then he keeps that landmark in line as he rows. The helmsman of a steamer (upper right) is using one of the oarsman's methods. He is steering toward a lighthouse at the harbor mouth. To help him steer accurately, the ship carries a pole called a "jackstaff" in the bow. The helmsman keeps the jackstaff tip on the landmark. Aviators (bottom) also use landmarks for daytime flying. They call this "contact" flying.

NAVIGATION. A man who rows a boat knows that he must keep turning his head to see where he is going. If he does not, wind and current will probably push him off his course. Every time he turns his head and changes the direction of his boat, he is *navigating*.

"Navigation" means finding out where you are on the water and whether you are steering correctly. (Airmen can use the seamen's methods with some changes). Near shore the navigator of a ship often uses the same method as the man in the boat. If he is coming into a port he may select a landmark, such as a hill or a lighthouse. Then he tells his helmsman to steer toward it. If the ship is sailing along a coast, the navigator checks on landmarks as he passes them. Steaming along coast lines in this way is called "coasting" or "piloting."

Dead Reckoning

But how does the navigator guide his ship over the open ocean with no landmarks in sight? He may use a system called *dead reckoning*. For this he needs a *chart*, or map of the water he is crossing, a *compass* to tell directions, and a device to tell the number of miles the ship has run since leaving port. One such device is an engine revolution counter. It works something like an automobile speedometer. Another is called a *log* (*see* Log, Ship's).

As the ship leaves the harbor mouth on its voyage, the navigator "takes a departure." He orders a sailor to set the log running and checks the direction or *bearing* of one or more landmarks. He notes his bearings and the time they were taken in the *log book*, an official record of the voyage.

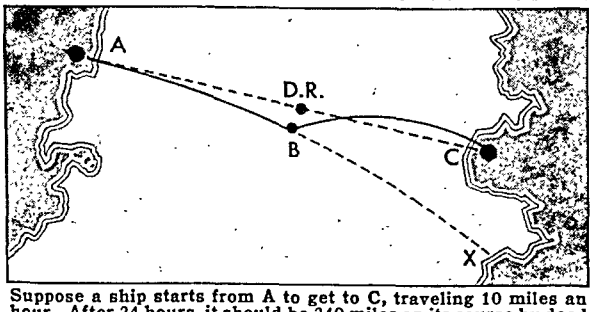
The navigator then tells the helmsman to steer the ship in a certain direction called a *course*. To find the course he draws a line on his chart from the harbor mouth to the next land he wants to reach. He checks the ship's speed from hour to hour. Every few hours he calculates how far the ship has traveled and marks this distance on his course line. Each mark is labeled "D. R." because it is the "dead reckoning" position for the ship at the moment the mark is made.

Sometimes this dead reckoning position is the actual position. But often wind and current carry the ship off its course or affect its speed. Then the navigator must correct his course.

Correcting the Course

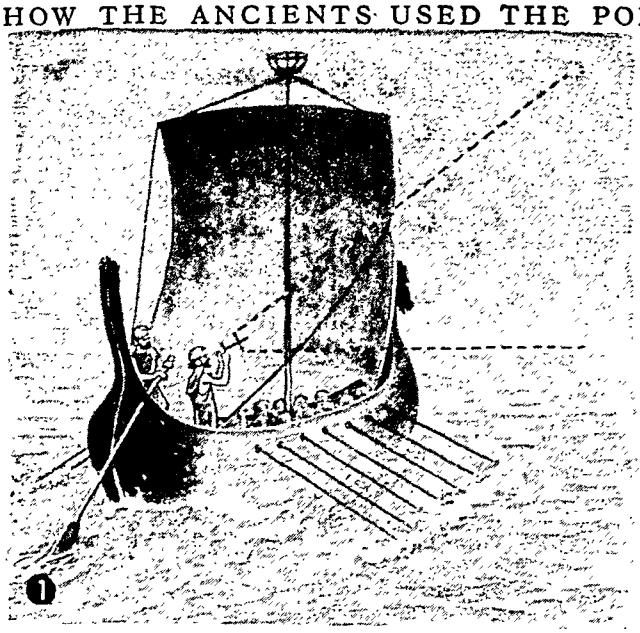
To make this correction, he must learn where the

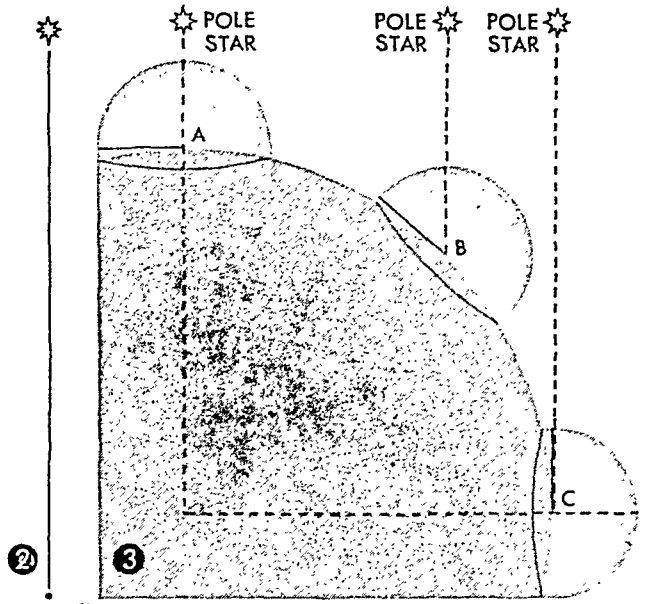
WHY DEAD RECKONING NEEDS CORRECTION



Suppose a ship starts from A to get to C, traveling 10 miles an hour. After 24 hours, it should be 240 miles on its course by dead reckoning at the point marked D.R. Actually, a cross wind has blown it off course and it is at B. (This crosswise drift is called *leeway*.) If the navigator should keep going by dead reckoning, the next day's travel might bring the ship to X. But at B the navigator checks his position by observing the sun or the stars and knows he has been blown off his course. So he puts the ship on a new course (heading a little north of C to allow for leeway) and he reaches his destination.

HOW THE ANCIENTS USED THE POLE STAR TO FIND THEIR LATITUDE





1. We see how the Phoenicians and Greeks used the Pole Star to tell latitude by measuring how high it stood above the horizon. The next pictures show why this method works. 2. First we must appreciate how far away the Pole Star is. The diagram shows the earth as a dot 1/32 of an inch wide and the Pole Star above it. But even with the earth made this small, the line pointing to the star should be about 186,000 miles long to indicate the distance correctly. At such a distance it would be in the same *direction* wherever we view it from the earth. 3. We see observers A, B, and C. The dome over each one represents the sky as he sees it. The lower edge of each dome is the observer's horizon and the dotted lines show where each sees the Pole Star. As we can see, observer A at the North Pole sees the star directly overhead (at his zenith). Observer B at latitude 45° N. sees it halfway between the horizon and his zenith. Observer C on the equator sees the star on the horizon.

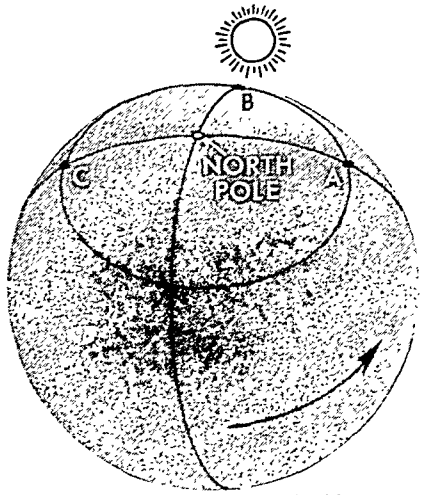
ship has been taken off its track. He does this by finding the *latitude* (location north or south of the equator) and the *longitude* (location east or west of the Greenwich meridian). If the ship is north of the equator, the navigator can find latitude from the Pole Star (also called Polaris and the North Star). Sailors have known how to do this since the days of the ancient Greeks and Phoenicians.

The Pole Star indicates north because it stands almost exactly above the North Pole of the earth. It also tells latitude by its height above the horizon. If you lived at the North Pole, the Pole Star would be right over your head every night. If you went south from the pole, the star would seem to move down toward the northern horizon. It would move down as many degrees as you travel south from the North Pole.

For example, if you found that the Pole Star was 30 degrees down from your overhead point (zenith), you would be 30 degrees south of the North Pole. But the latitude of the North Pole is 90 degrees north. Hence you would be at 90° minus 30°, or 60° N. latitude.

The sun also tells latitude, but not so easily as the Pole Star. The calculations are more difficult because the sun shifts north and south with the seasons. But an almanac tells where it is every day and hour. Once the navigator knows this location, he can use the sun like the Pole Star by figuring from wherever it is at the moment. By observing the Pole Star at night and the sun during the day, the navigator can fix latitude several times throughout the 24 hours.

TELLING LONGITUDE



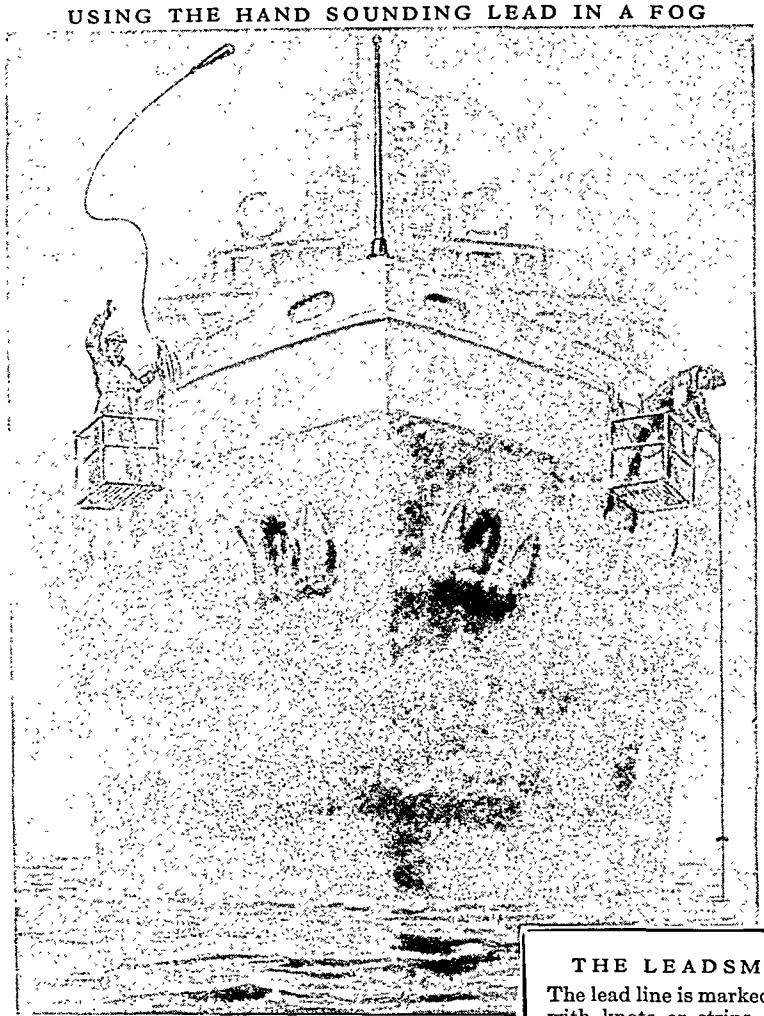
If you were in outer space, looking over the North Pole toward the sun, you could see an observer at A watching the sun rise. His time would be about 6:00 A.M. An observer at B would see the sun in the south and his time would be noon. At C the sun would be setting at 6:00 P.M. The times differ because each observer is one-fourth of the way around the earth from his neighbor. The observers could learn their difference in longitude by comparing their times at this instant.

To find longitude, navigators use the time of day. To see how they do this, we must understand the relation between *time* and *distance*. Remember that the earth rolls around completely once in 24 hours. Every place on the earth goes around in exactly that time. In six hours, each place goes around one-fourth of the way. So six hours in "time" means one-fourth of the way around the earth in "distance." Any other time means a corresponding amount of distance.

The picture on the left shows how navigators can use this relation between time and distance. From it we see that the time can be 6:00 A.M., noon, and 6:00 P.M. at the same instant but at different places on the earth. If navigators at these places know this difference, they know how far apart they are from each other around the earth.

However, navigators compare the time wherever they are with the time of the observatory at Greenwich (pronounced *grĕn'ĭch*), England (*see* Time).

USING THE HAND SOUNDING LEAD IN A FOG



Two leadsmen are taking soundings as a ship creeps ahead in a fog. They stand on portable stages outside the rail. The sailor on the starboard side has swung his lead line and let it fly forward. This is called "heaving the lead." The lead will reach bottom at the time the ship's motion brings the sailor over the lead. The lead line will then hang straight down, and he can tell the depth from a mark on the line, just as the other sailor is now doing.

They carry Greenwich time on chronometers and determine their own time by observing the sun and stars. Details of the method are given in the article on Latitude. In this way the navigator finds his latitude and longitude several times a day. From each finding he decides what course to steer next in order to keep heading toward his destination.

Charts and Instruments

The navigator needs many aids to help him do his work. First, he needs *charts* of all the waters he expects to sail. The charts show coast lines, islands, landmarks, lights, depths, buoys, and other vital facts. These facts rarely change from year to year.

Changing conditions are shown on *pilot* charts. A pilot chart tells how strong the winds and currents are along the sea routes, where storms are to be expected, and where icebergs and wrecks are located. This information helps the navigator to figure out the safest and quickest route. American navigators get a new pilot chart every month from the government.

All ships have compasses for steering and for taking bearings. They show where north is because the compass needle is attracted by the earth's magnetism in the north (*see* Compass, Magnetic). They usually show directions in degrees. Many ships also have gyrocompasses, worked by electricity (*see* Gyroscope).

Navigators use a very accurate timekeeper called a *chronometer*. The best ones lose or gain only a few seconds a day. The Naval Observatory in Washington, D. C., sends radio time signals daily for checking ship's chronometers (*see* Watches and Clocks).

The *lead line* is a length of cord with a lead weight at one end. Navigators use it near shore to find the depth of the water. Markers along the length of the cord show various depths in fathoms. (One fathom is six feet.) A sailor drops the lead in the water, and when it hits bottom he reads the depth of the water from the marker nearest the water's edge. Sometimes there is a small hole coated with tallow in the under side of the lead. A sample of the bottom sticks to the tallow when the sailor brings up the lead. This sample helps the navigator find the ship's exact position, for he can compare it with the type of bottom shown on his chart. It also tells him if the bottom will hold the anchor strongly. Navigators also use the lead line to follow an unmarked channel in a shallow harbor.

THE LEADSMAN'S CALLS

The lead line is marked at various lengths with knots or strips of leather or rags. These are called "marks" and they show depths in fathoms. A fathom is 6 feet. The leadsman may call out, "By the mark five!" meaning that the water is 5 fathoms, or 30 feet, deep. The call, "And a quarter five!" means that the depth is 5¼ fathoms. "And a half five!" means 5½ fathoms. If no mark shows at the water's edge, the depth is estimated and reported as a "deep." "By the deep four!" means an estimated 4 fathoms.

Large ships often have a machine called a *sonic depth finder* or a *fathometer*. This device automatically measures the depth of the water. It sends a supersonic signal directly down into the water and measures the time an echo takes to return from the bottom. One type of instrument can keep a constant record of the depth on a moving strip of paper.

The navigator would not put to sea without his copy of the *Nautical Almanac*. This book is published yearly by the United States Naval Observatory. It contains all kinds of facts useful in navigation. For each day of the year it tells the location of the sun, moon, and stars in the heavens, and, if necessary, how the positions change from hour to hour.

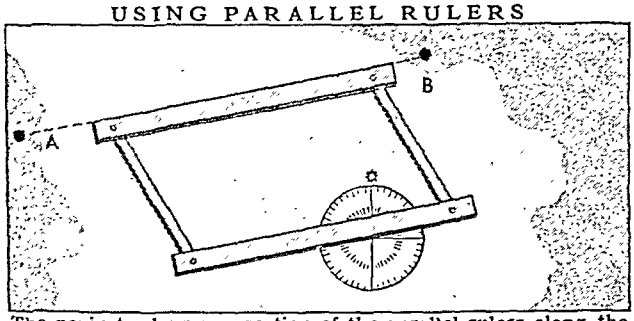
Radio helps the navigator in many ways. Most countries have special radio stations on their coasts. If the navigator is not too far from land, he can ask one of these stations for help in checking his position. An aviator can make the same request. Other stations send out special automatic signals. Ships with "radio direction finders" use these signals to find their position.

Many airplanes and large ships carry radar sets. With these a navigator, traveling at night or in a fog, can see a picture of land sometimes as much as one hundred miles away. This picture shows him where he is and helps him plot a course. *Loran* is a long-range radar aid to navigation (*see* Radar).

Sailing Across Oceans

On a long voyage across open seas to a distant port, the navigator can simply steer by compass if he likes. However, he must know the actual direction between his starting point and his destination,

USING PARALLEL RULERS

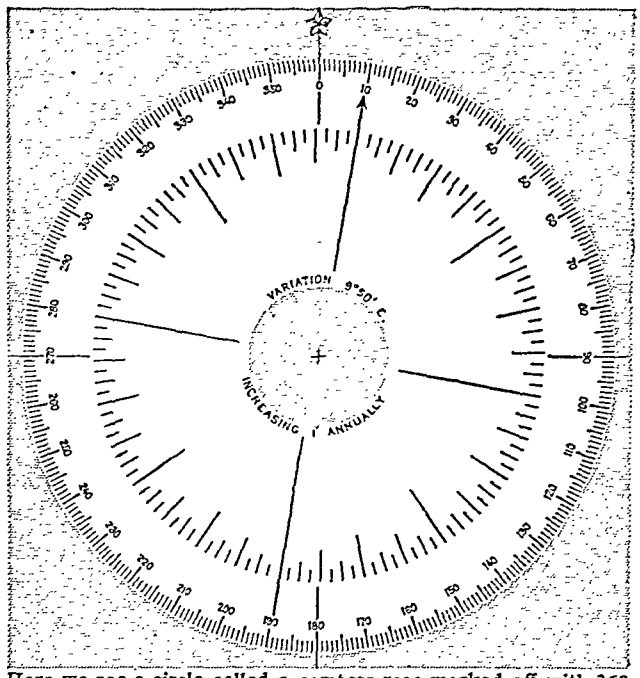


The navigator lays one section of the parallel rulers along the course line AB and the other through the center of the compass rose. He reads the direction of the course line at the point where the second section crosses the numbered edge of the compass rose. The ruler arms keep the sections always parallel.

but he can learn this from his chart. First he draws a straight line from one port to the other. This line will cross the lines of longitude at a certain angle. By measuring the angle, the navigator learns the direction of the course. If he does not want to measure, he can "carry" the course line to a compass rose on the chart with parallel rulers. Then he can read the direction from the rose.

A line which crosses all meridians of longitude at the same angle is called a *rhumb* line or *loxodrome*.

A COMPASS FOR MAPS AND CHARTS

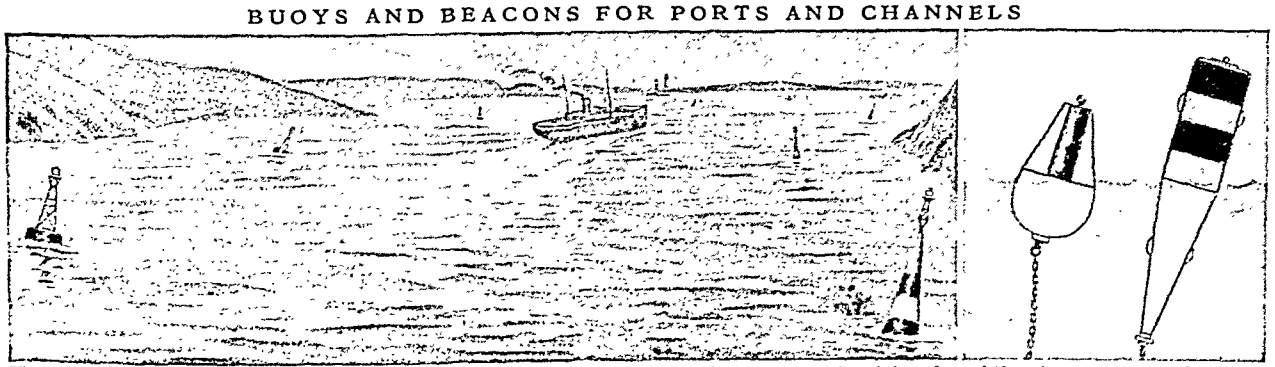


Here we see a circle called a *compass rose* marked off with 360 degrees. The compass rose appears on all navigational charts, with 0° pointing due north. The inner circle shows how magnetic compass bearings vary from true bearings in the region shown by the chart, as explained in the article on Compass. This compass rose is for an area where "magnetic north" is 9°50′ east of "true north" for the year the chart was printed. The picture in the adjoining column shows how the navigator applies his parallel rulers to the course line and to the center of the compass rose to find the direction of the course line.

The use of rhumb lines for courses is called *plane* sailing, because the navigator follows courses just as he gets them from the flat or plane surface of the map. But usually these courses are not the shortest ones, as the surface of the ocean is not flat like the chart. It is curved; so, as a rule, the straight line on the chart gives a false impression of the best course to follow. To see just how wrong it is, let us suppose we want to go from Seattle to Tokyo, Japan. Let us check where a straight line between these points would actually go on the earth or on a globe.

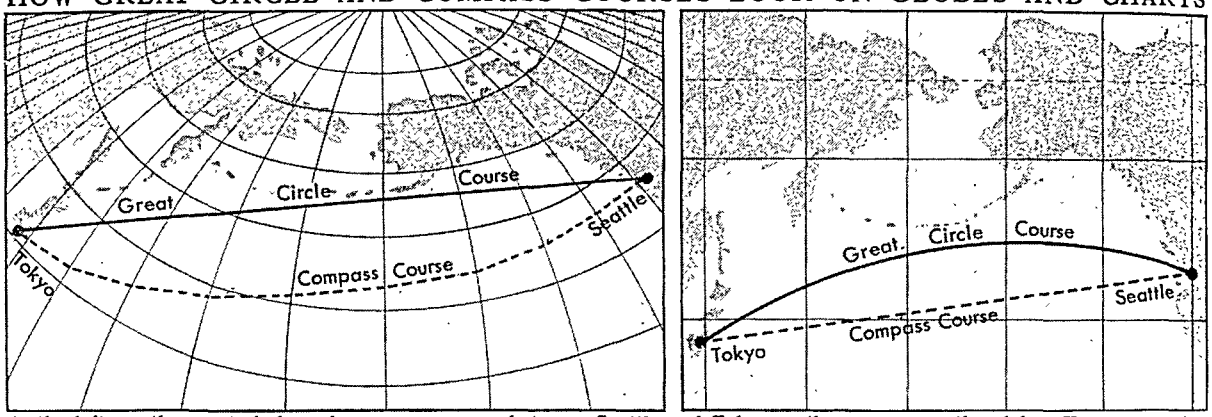
To get a straight line from Seattle to Tokyo on a globe, you would have to poke a wire *through* the globe from one port to the other. To follow this line,

BUOYS AND BEACONS FOR PORTS AND CHANNELS



Here a ship is making its way along a channel edged with buoys. In American waters, the right edge of the channel (as a ship enters port) is marked by *nun* buoys. These have cone-shaped tops, are painted red, and are marked with even numbers. The left side is marked by flat-topped *can* buoys. These are black and marked with odd numbers. Buoys may be lighted at night. The two beacons beyond the ship form a *range*. By keeping them one above another, the helmsman stayed on the correct course as he came up the channel to his present location. At the right, the buoy with perpendicular striping marks the middle of a channel. Ships pass this close aboard. The buoy with horizontal striping marks an obstruction. Ships sail wide of this.

HOW GREAT CIRCLE AND COMPASS COURSES LOOK ON GLOBES AND CHARTS



At the left are the great circle and compass courses between Seattle and Tokyo as they appear on the globe. You can see that the great circle course is actually the shorter distance. The compass course, which must cut all the meridians at the same angle, is much longer. In the flat map at the right, the compass course only appears shorter because a map distorts global distances.

a ship would have to sail *through* the earth. Naturally it cannot do that. It must go along the curved surface of the earth. Hence its course must be some sort of curve. The straight line as the shortest distance between two points on the chart is an illusion caused by the fact that the chart is flat.

Great Circle Courses

Along what route does the best course actually go? A simple experiment will show you. Take a piece of string and a globe of the world. Cut the string so that it is just long enough to go all the way around the equator on your globe. Then stretch the string around so that it passes over Seattle and Tokyo. Make sure that the ends just reach around the globe and the string cuts the earth exactly in two parts just as it did on the equator.

Now notice that the string makes a circle around the earth, and the center of the circle is at the center of the globe. A circle of this kind is called a *great circle*. It follows the shortest distance along the curvature of the earth between any two points it passes through, such as Seattle and Tokyo. If you doubt this, try shifting the string to one side or the other. Whenever you do this, you have to use more string to reach between your ports.

How can the navigator follow the course marked out by the string? Look at the globe again and see where the string crosses the various lines of latitude and longitude. Now take a chart and mark these crossing points on the chart's lines of latitude and longitude. Connect the points and the chart will show the great circle course. If you do not want to mark a chart, the picture on this page shows you how the course line will look.

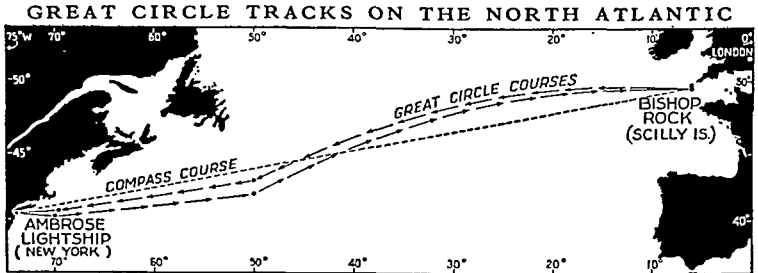
Does this mean that a navigator must use a globe in order to find a great circle course? Many of the early navigators did so; you often see globes in old-time pictures of Columbus, Magellan, and Drake. But today the maritime governments provide simpler methods. They print tables of calculations that help a navigator figure out great circle courses quickly and easily.

A navigator can also use a special kind of map called a *gnomonic* map (*see* Maps). This map works like a globe in reverse. It has the parallels and meridians drawn so that a straight line between two ports crosses them exactly as the string crosses the same lines on a globe. Hence the straight line shows the great circle course.

But navigators use ordinary charts rather than gnomonic charts because they are the most convenient kind for most purposes. On shorter voyages a rhumb line or compass course is almost as short as a great circle one and it can be determined easily by the plane-sailing method. Even on great circle voyages, the ordinary chart is more convenient, once the navigator has laid out his curving great circle course on it. After that he can plot his positions easily, as he finds them from day to day, and compare them with where he should be on the great circle course. In this way he can tell directly from the map in what direction to steer to get back on the course.

Navigators sometimes veer off the shortest great circle courses to avoid danger of collision or going aground. For example, maritime governments have agreed that the great circle tracks in the North Atlantic both start and end at 50° W. longitude rather than at New York Harbor. This keeps ships clear of the New England coast. The government regulations require that

GREAT CIRCLE TRACKS ON THE NORTH ATLANTIC



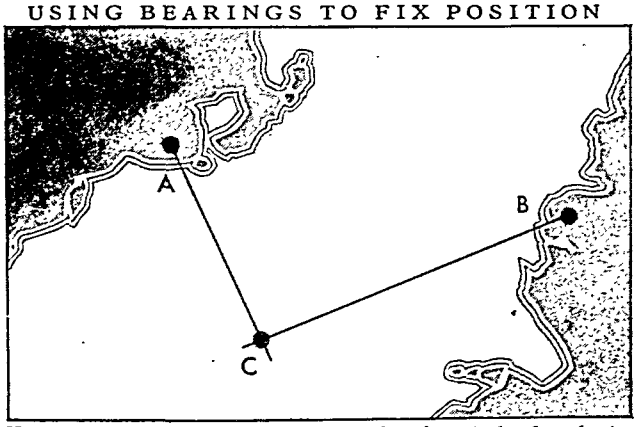
The arrows in this picture show the eastward and westward great circle track in the North Atlantic. They start and end at about 50° W. longitude so that ships will stay clear of the rocky New England coast.

ships must use separate eastbound and westbound tracks. The tracks are one degree (about 69 statute miles) apart. Both tracks are shifted southward when icebergs are adrift and northward when the ocean is ice-free to take advantage of the shortest route.

Coastal Piloting

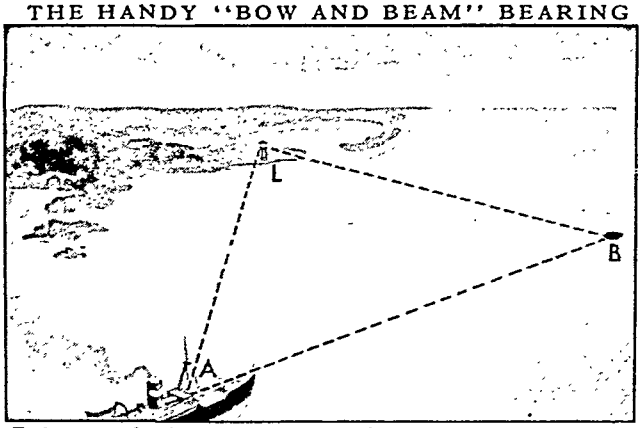
When close to land, the navigator uses special methods. He follows straight compass courses and checks his position constantly by noting the bearings of landmarks, buoys, and lights. He draws these bearings on his chart. Where they cross his course line is his position at the time the bearing was taken. Two bearings taken at approximately the same time will cross if drawn on a chart to form a *fix* or a *crossfix*.

USING BEARINGS TO FIX POSITION



Near shore a navigator uses compass bearings to landmarks to learn his position. Here he has taken the bearings to landmarks A and B. On his chart he draws the reverse bearing *from* each landmark, using the compass rose and parallel rulers, as shown on the preceding page. The two lines cross at point C. This was the ship's location when he took the bearings.

THE HANDY "BOW AND BEAM" BEARING



To keep a safe distance offshore, navigators may use the method shown above. When the ship at position A has a landmark (L) 45° off the bow, the navigator notes the ship's mileage on the ship's log. When the ship has the landmark squarely abeam (position B) the navigator notes the mileage again. The distance run (AB) is equal to the distance offshore (BL).

The navigator can find his distance to shore as he sails along a coast by taking "bow and beam" bearings as shown above. Since angle A is 45°, the triangle ABL has a right angle at B. Hence the sides AB and BL are equal and he learns his distance offshore.

Navigating by Sun and Stars

AS A SHIP sails over the open seas, its navigator can use the sun and stars as his guides. But these guideposts are not fixed. They seem to move across the heavens in a majestic procession. The navigator must use special methods to allow for this movement and find his position. The methods are called *celestial navigation*, because they use the heavenly bodies.

The methods vary, but the general principle is that at any instant of time, each heavenly body is directly above *some* point on the earth. Nautical almanacs have information that tell where this location is for every important celestial body at every minute of Greenwich time. If a navigator identifies a bright star directly overhead and checks the time, he can look up the location of the star in the almanac. His position on the earth will be directly below the star. (The overhead position is called the *zenith*.)

Usually, however, circumstances prevent use of this simple method. Then the navigator must select some heavenly body and calculate how far he is from being directly under that body. To check upon the distance, he measures the angular height (*altitude*) of the body above the horizon.

To measure the altitude of the sun or stars, the navigator uses an instrument called a *sextant*. The picture on the next page shows how it is used. Aviators use a smaller instrument called a *bubble octant*. This has a bubble suspended in a container of liquid, and the aviator uses the bubble as an "artificial horizon." He does this because often the horizon is obscured or below his line of vision. Now let us see how the special methods work.

Measuring the Altitude of the Sun

The simplest method is called "shooting the noon sun." The term means measuring the height of the sun at noon with a sextant. As the sun reaches the highest point, at approximately noon, the navigator measures the angle it makes above the horizon. Let us say that he is in the North Atlantic in summer and he finds the angle to be 70 degrees. This means that the sun is within 20 degrees of being directly over his head (that is, at zenith). Thus the ship is 20 degrees north of the sun.

But the navigator also can find from his *Nautical Almanac* at what latitude the sun is directly overhead at this moment. Suppose that he finds that it is 15° N. This tells him his own latitude. If the sun is 15 degrees north of the equator and the ship is 20 degrees north of the sun, the ship must be 35 degrees north of the equator. In other words, the ship is at latitude 35° N.

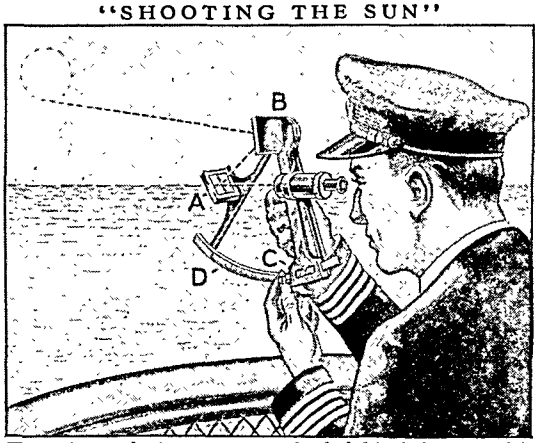
The navigator can determine his longitude from this same sight. He keeps measuring the sun at midday with his sextant until he finds it at its highest point above the horizon. Now the time is noon at his position. His chronometer tells him the time at Greenwich at this same instant. The difference between the two times tells him his longitude—once he

has changed his local time, as judged by the sun, to "mean" or "clock" time (*see* Time). The method can be applied with suitable variations to the sun at other hours or to stars at night.

The Sumner Line of Position

Until early in the 19th century, these methods were standard with all navigators. But in 1837 an American sea captain named Thomas H. Sumner devised another ingenious method. A storm drove his ship dangerously close to the west coast of Ireland and he was unable to check his dead reckoning position with any celestial observation. Finally he was able to take several sights and, by a series of brilliant deductions, he established his ship's position.

"SHOOTING THE SUN"



Here the navigator measures the height of the sun with a sextant. He sights on the horizon through the *unsilvered* half of the mirror A. Then he moves arm C until the upper mirror B, attached to C, throws an image of the sun on the *silvered* half of A. The pointer on arm C shows the altitude of the sun on the scale D.

Sumner based his method on two facts already mentioned. Every heavenly body is always directly above some point on the earth; and the location of this "sub-stellar point" can be computed from the time of observation and from data in the almanac. A similar rule holds equally true if an observer sees a star on a slant instead of directly overhead. He will be somewhere on a circle which has the star's sub-stellar point as its center. We can see this in the right-hand picture below.

The observer can calculate the radius of the circle from the angle at which the star stands off the vertical. This will tell him how far he is from the star's sub-stellar point. It will not tell him his direction from the point, but he can remedy this by determining a second circle from another star. The two circles will intersect at two points, and one of these points must be the observer's position on the earth. Since the navigator nearly always knows his approximate position, he can choose the correct intersection.

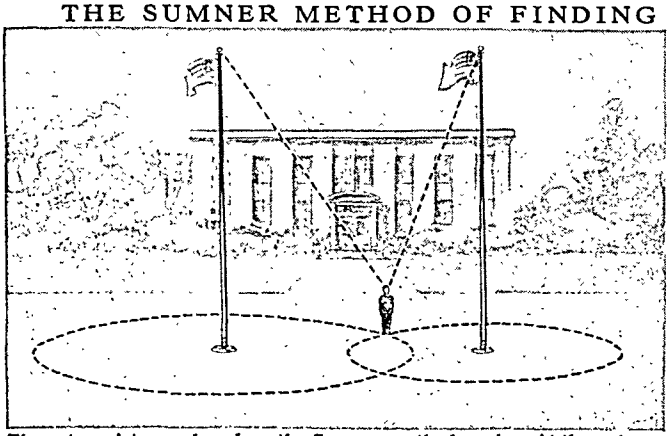
The circles cover a great portion of the globe, much too large for a chart, so the navigator draws only the small intersecting portions. These are so small in comparison with the circles that they can be drawn as straight lines, called *lines of position*. So the position of the ship lies somewhere along each line—actually where the lines cross. The pictures at the bottom of the page show how you can demonstrate the Sumner method for yourself. Finding position in this way is sometimes called "taking a celestial fix."

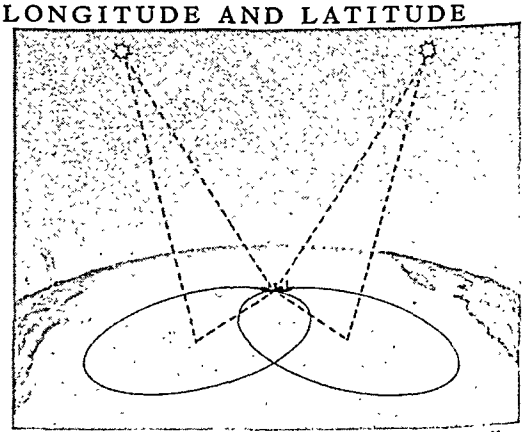
History of Navigation

Since the dawn of civilization men have crossed the water in boats (*see* Boats and Boating; Ships). They learned early to travel by water, carrying their trade goods to other countries. Going to sea became highly important to many people living near the Mediterranean Sea—the Sumerians, Cretans, Egyptians, Phoenicians, and Greeks (*see* Aegean Civilization; Phoenicians). The Scandinavians too were daring sailors from early times.

The sailors in very ancient times never went very far from land. Their voyages consisted largely of "coasting"—skirting the coasts and sighting on known landmarks. Usually they traveled only by day and pulled their boat up on a beach at sunset. They stayed ashore

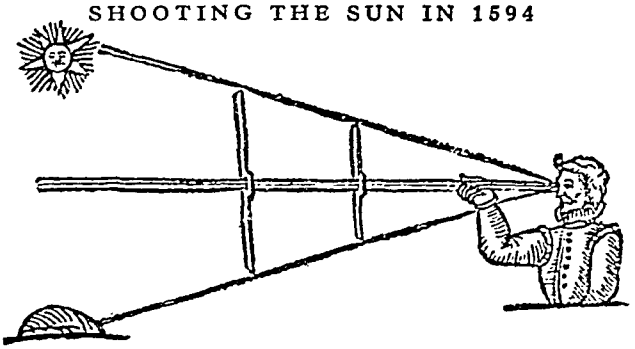
THE SUMNER METHOD OF FINDING LONGITUDE AND LATITUDE





These two pictures show how the Sumner method works. At the left is a schoolyard with two flagpoles. A boy stops and looks up at the top of one of the poles. His head and eyes tilt at a certain angle. He walks around the flagpole, keeping his head and eyes always at the same angle. He returns to his starting place and finds that he has walked in a perfect circle. Now he looks up at the second flagpole top. His head and eyes tilt at a new angle. He circles around the second flagpole to his original starting point. He finds that the two circles intersect in two places, and one of them was his starting place. The radius of each circle is the boy's distance from the flagpole. Now we can see how a navigator uses a variation of this method. Instead of flagpole tops he uses two stars. And he does not sail around to trace the circles. He simply measures the altitude of each star with his sextant, and from these measurements he calculates the radius of each circle. Then he calculates where the circles will intersect on his chart and thereby learns his real location on the face of the earth.

SHOOTING THE SUN IN 1594



This old picture of a cross-staff was taken from 'The Seaman's Secrets', a book by John Davis, printed in 1594. To use the cross-staff, the observer sighted from the base to the tip of the farther crosspiece and adjusted the two crosspieces to line up with the sun and the horizon. He then read the angular height of the sun from a scale marked on the staff.

to cook their evening meal and to rest for the night. They did not have charts but sometimes they found their way by a list of directions. (The Romans called such a list a *periplus*.) The list contained details about landmarks, good anchorages, and such hazards as shoals and reefs.

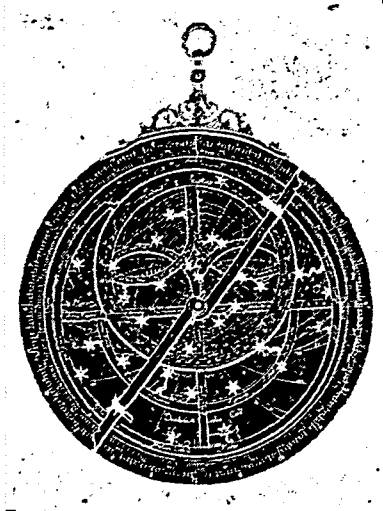
The Phoenicians and Greeks were the first of the Mediterranean sailors to navigate far from land and to sail at night. They made primitive charts and they knew a crude form of dead reckoning. The sun and the Pole Star told them direction. From the height of the Pole Star above the horizon they learned to tell how far north they were. They estimated distances from the time it took to cover them.

Advances in seamanship—that is, the art of handling a ship—went along with navigation. The Egyptians used rowers, and the Phoenicians and Greeks increased oar power by putting rowers in upper "banks" or tiers. The Greeks put a second mast in the bow, and the Romans a third mast in the stern. The Romans also used a topsail on the mainmast. By the first century B.C., the Gauls in Brittany abandoned rowers completely. They were perhaps the first to do so. They also learned to sail partly into the wind (to windward) by tacking.

One great improvement in seafaring came when men learned to store water in wooden casks with tight lids instead of in goatskin containers or earthern jars. This new method kept down animal and vegetable growths that made the water unfit to drink on long voyages.

Another great aid was the magnetic compass. Men had known of the north-seeking properties of the lodestone for many centuries before the Christian Era. But the first use of the magnetic compass by navigators seems to have been in the 12th century. A century later the Italians learned how to make a good chart called a *portolano*. It showed an outline of the coast and it had crosslines to help in finding compass directions.

AN ASTROLABE



The diagonal bars form the alidade, or pointer. The other parts were used to find the time of day. This instrument is in the Adler Planetarium, Chicago.

Other Aids

At this time navigators used the *cross-staff* and the *astrolabe*, two devices which the Greeks had invented to measure the altitude of heavenly bodies.

The cross-staff was a stick or staff about a yard long with a shorter sliding stick set at right angles to the staff. To make an observation the navigator pointed the staff at a point about halfway between the horizon and the sun or a star. He moved the crossbar until the sights at

WORLD MAP AFTER THE DISCOVERY OF AMERICA



This world map was published about 1513 and was used for many years thereafter with minor corrections. The points with their radiating crosslines were used by mariners to find compass directions; they were the forerunners of the compass roses found on present-day maps and charts. The original of this chart is now in the John Carter Brown Library in Providence, R. I.

its ends were in line with the observed body and the horizon. A scale placed along the staff showed the angle, or height above the horizon, of the body.

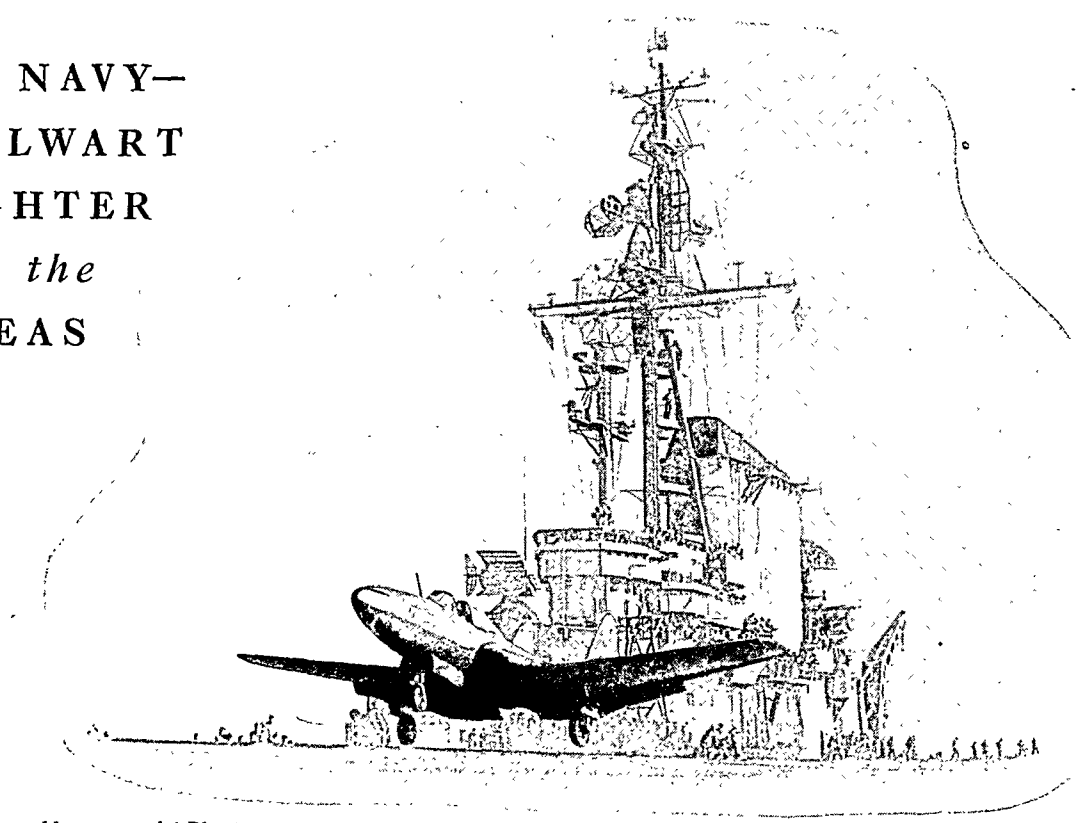
The astrolabe was a circular plate of brass or bronze, from four to twenty inches in diameter. A pointer, called an alidade, was pivoted at the center of the plate. One man held the astrolabe by a small ring at the top. Another man crouched or knelt so that he faced the rim of the instrument. He then pointed the alidade at the sun or a star and measured the angle from the markings on the plate.

Great explorers like Columbus and Magellan made their voyages with these navigating aids. But the instruments were not satisfactory; and for two centuries after Columbus, no clock could keep time well enough to help in fixing longitude.

In the 17th century, however, Britain, France, and other maritime countries began aiding the development of navigation. They founded astronomical observatories to produce good almanacs and encouraged mapmaking and invention of needed instruments. In 1730 Hadley of England made good observation possible by inventing the quadrant. This soon became the sextant used today. The problem of fixing longitude was solved when Harrison of England produced several chronometers between 1729 and 1765, and Le Roy of Paris perfected the instrument in 1765 (*see* Watches and Clocks). At this time, Capt. James Cook's memorable voyages of discovery proved that navigation had become an exact science (*see* Cook).

Early in the 19th century, Nathaniel Bowditch of Salem, Mass., devised many improved methods. His book was adopted by the government as the *American Practical Navigator*. In 1837 another American, Capt. Thomas Sumner, devised the Sumner Line method of fixing position while caught in a storm off Ireland. Matthew Fontaine Maury made memorable studies of wind and weather and helped to develop government aid to navigation. Today radio, radar, and other electronic devices help the navigator.

The NAVY— STALWART FIGHTER *on the* SEAS



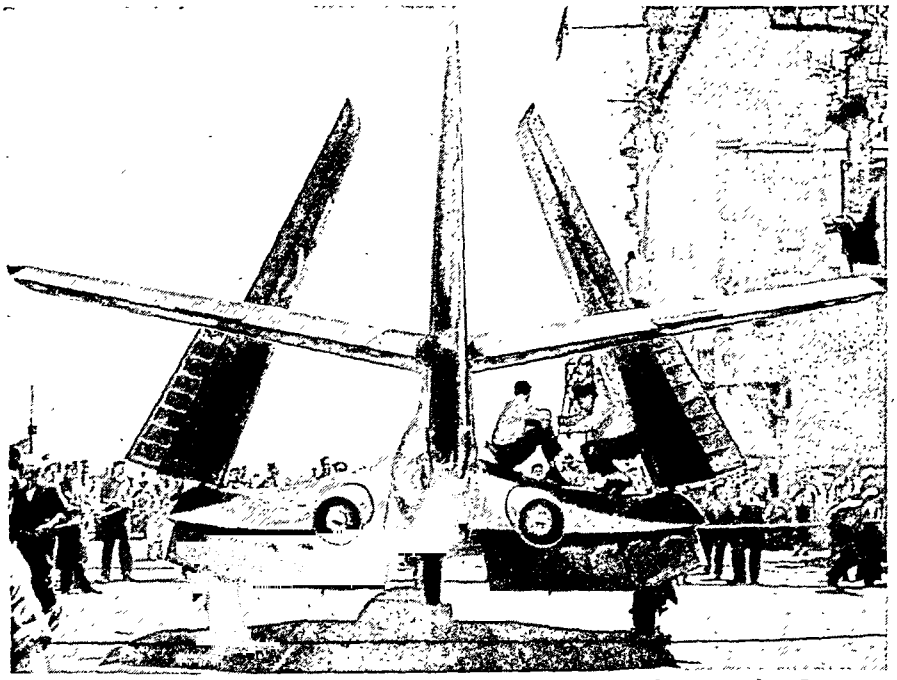
With a sudden roar, a jet Phantom (FH) takes off from the flight deck of the carrier *Franklin D. Roosevelt*. The Phantom was the Navy's first carrier-based jet fighter. Carrier planes provide the Navy's front line of striking power.

NAVY. "The use and control of the sea is and has been a great factor in the history of the world." These words of the famous naval historian Capt. Alfred T. Mahan are as true today as when he wrote them in 1889.

In peacetime, the seas provide great avenues of transportation for all merchant nations. In time of war only the nations with the strongest navies can protect their vital commerce and carry an attack overseas.

Control of the seas is the principal function of the United States Navy. It gains and keeps this control by defeating enemy attacks from the air, on the sea, and under the sea. It guards friendly mer-

FIGHTER PLANE READY FOR STOWAGE



This rear view of the Phantom shows the plane after it has landed on a carrier. Crewmen have folded the wings to save space when the plane is sent below to the hangar deck. On either side of the vertical rudder are exhaust nozzles for jet propulsion.

chant shipping and denies the use of the sea to enemy commerce. The Navy also transports troops, equipment, and supplies to foreign shores for counterattacks; and it supports these attacks with planes and guns. These tasks seldom change, although the weapons and tactics needed to accomplish them constantly change.

Naval Combat in Two World Wars

Allied naval strength provided control of the sea throughout the first World War. The chief enemy threats came from surface ships and submarines. In the second World War, the United States dominated the Pacific Ocean only after winning the great naval battles of the Coral Sea, Midway, and the Philippine Sea (*see* World War, Second).

In previous wars surface vessels fought with their naval guns. But the second World War matched carrier and land-based planes against enemy planes and ships. Air attacks proved decisive long before opposing fleets got within gun range. In each battle United States planes provided the margin of victory by destroying Japanese planes and carriers. Thus control of the sea depended first upon control of the air over the sea.

Meanwhile the American and British fleets controlled the surface of the Atlantic. But here German submarines took a heavy toll of Allied ships and at times even dominated local areas. The most effective antisubmarine opposition came from "hunter-killer" teams composed of an aircraft carrier and a specially equipped group of destroyers. Carrier planes attacked the "U-boats" with rockets and depth charges. If the submarine evaded destruction, the planes called on destroyer members of the team to drop their barrages of depth bombs. Sonar buoys dropped from the air and the sonar and hydrophones of destroyers made it difficult for submerged submarines to escape.

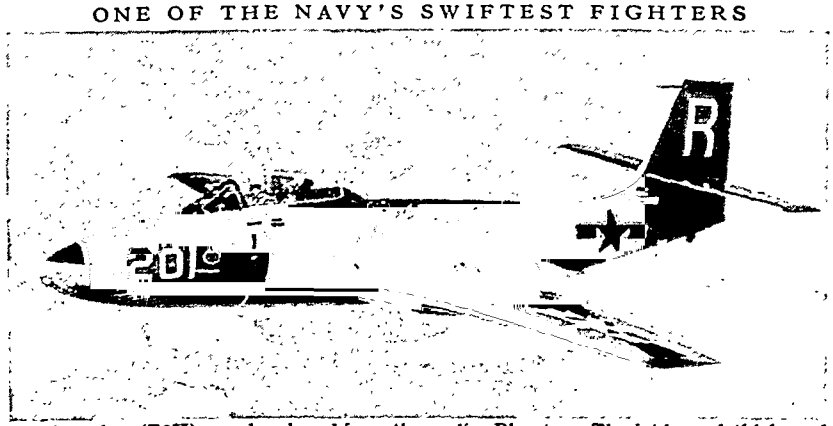
Another method of combating submarines was to assemble all merchant shipping in *convoys*. These were protected by aircraft and antisubmarine vessels such as destroyer escorts. Sometimes a small aircraft carrier accompanied the convoy. Its fighter planes provided protection against enemy air attack as well as against submarines. Small patrol craft (subchasers) also proved effective in combating the submarine menace, especially in the Caribbean area.

Improvements in submarine design since the second World War have made them more effective and difficult to detect. A *snorkel* supplies air under water, and a submarine can remain submerged for long periods to conceal its location (*see* Submarine). To meet the danger from enemy submarines the Navy developed hunter-killer destroyers with special antisubmarine equipment. It also experimented with antisubmarine cruisers and small submarines (called "killers") designed to seek out and destroy enemy submarines.

Other Improvements in Naval Weapons

The development of the atomic bomb also affected naval tactics. The major changes made by the Navy provided greater dispersion of ships in formations and alterations in design to minimize damage from radioactive materials. These changes grew out of research in 1946 when two atomic bombs were dropped

ONE OF THE NAVY'S SWIFTEST FIGHTERS



The Banshee (F2H) was developed from the earlier Phantom. The jet in each thickened wing root has a thrust of about 3,000 pounds. The plane carries four cannon in the nose. A bulletproof windshield and armor plate behind the cockpit protect the pilot.

on a target fleet at Bikini Atoll. The Navy also studied how to use atomic power and in 1951 began construction on the world's first atomic-powered submarine, the *Nautilus*.

Another object of naval research was guided missiles. In 1949 the Navy announced that it had successfully launched guided missiles from surface vessels and submarines. These weapons were designed to hit targets in the air and on the sea. It was believed that guided missiles could be used against even submerged submarines.

By the end of the second World War some people thought that the development of aircraft and new weapons had made navies obsolete. But one physical fact makes a navy necessary as long as there is a prospect of war. Warfare requires enormous cargoes of men, equipment, and supplies. Planes can carry only part of this vast tonnage overseas. The bulk of it must be transported in ships. And as long as ships are used, a navy will be needed to protect them from enemy attack.

HOW NAVY SHIPS ARE NAMED

Battleships (BB): states (*Missouri*)
Aircraft Carriers: Large Fleet Type (CVB), Fleet Type (CV), Light Fleet Type (CVL), battles, ships, famous men (*Midway, Wasp, Forrestal*); Escort (CVE), sounds and bays (*Puget Sound*)
Cruisers: Large or Battle (CB), possessions and territories (*Guam*); Heavy (CA), large cities (*Des Moines*); also Light (CL) (*Cleveland*)
Destroyers (DD): Navy and Marine men, congressmen, inventors (*Sumner*)
Submarines (SS): marine creatures (*Cod*)
Mine Layers (CM): abstract words (*Terror*)
Mine Sweepers (AM): birds (*Auk*)
Ammunition Ships (AE): volcanoes and terms for explosives (*Vesuvius*)
Hospital Ships (AH): synonyms for relief (*Haven*)
Cargo Ships (AK): stars (*Fomalhaut*)
Oilers (AO): rivers (*Merrimack*)
Transports (AP): Navy, Marine, and Army officers (*Gen. William Mitchell*)
Repair Ships (AR): mythological characters (*Briareus*)
Submarine Tenders (AS): submarine pioneers (*Fulton*)
Seaplane Tenders (AV): sounds and bays (*Salisbury Sound*)

There are exceptions to these usual ways of naming ships. Vessels such as torpedo boats (PT), submarine chasers (PC), and landing craft are only numbered.

Organization of the Navy

To FULFILL its duties the Navy needs first of all a network of bases, starting on the American shores and spreading far out across the oceans. The course of events in the second World War provided most of the areas needed for a complete array of protective bases. These bases also gave the Navy launching sites for amphibious attacks.

On the Atlantic coast the Navy maintains major bases at Boston, New York (Brooklyn), Philadelphia, and Norfolk. The Navy leases a base from Cuba at Guantánamo Bay on the south coast of Cuba. This base controls the Windward Passage—the main opening between the Caribbean and the Atlantic. Other bases are maintained as far south as Trinidad and in the Panama Canal Zone.

On the Pacific coast the Navy has bases at Bremerton in Puget Sound, on Mare Island in San Francisco Bay, at San Pedro (near Los Angeles), and at San Diego. Pearl Harbor on Oahu in the Hawaiian Islands is the largest base in the Pacific. Guam, in the Marianas, is the largest beyond Pearl Harbor. Since the second World War, bases have been maintained at Yokosuka in Japan, on Okinawa, and at Subic Bay in the Philippines.

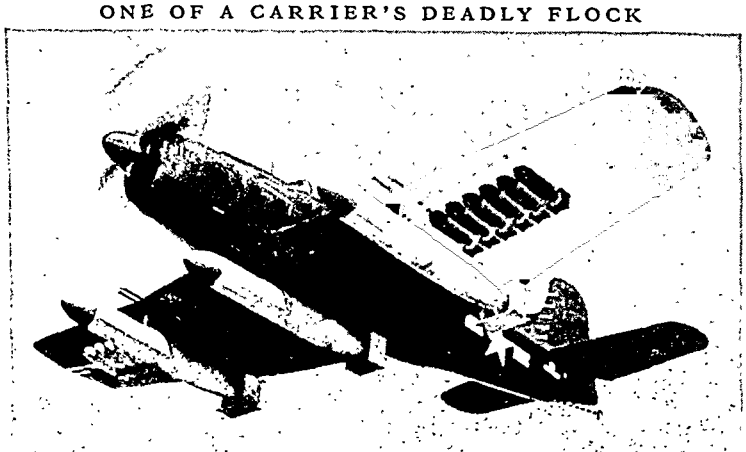
Navy's Combat Organization

During the second World War Great Britain and Germany used most of their aircraft in independent air forces under separate commanders. The United States divided its air strength between the Army and Navy. Thus the Navy could combine air strength, surface vessels, and submarines in the most effective groups to strike whatever blows seemed best for winning the war.

Under this plan the Navy organized a *task force* to accomplish each mission. The number and kind of ships and aircraft varied according to the mission. Some forces were sent to win air supremacy over an island, island group, or lane of ocean travel. Others went to bombard enemy positions. The largest forces were organized to carry and support invasions of enemy-held islands, island groups, and continental coasts. A task force was usually called by number, such as Task Force 58. The largest forces were sometimes called fleets and given a number, such as the Third Fleet or Fifth Fleet.

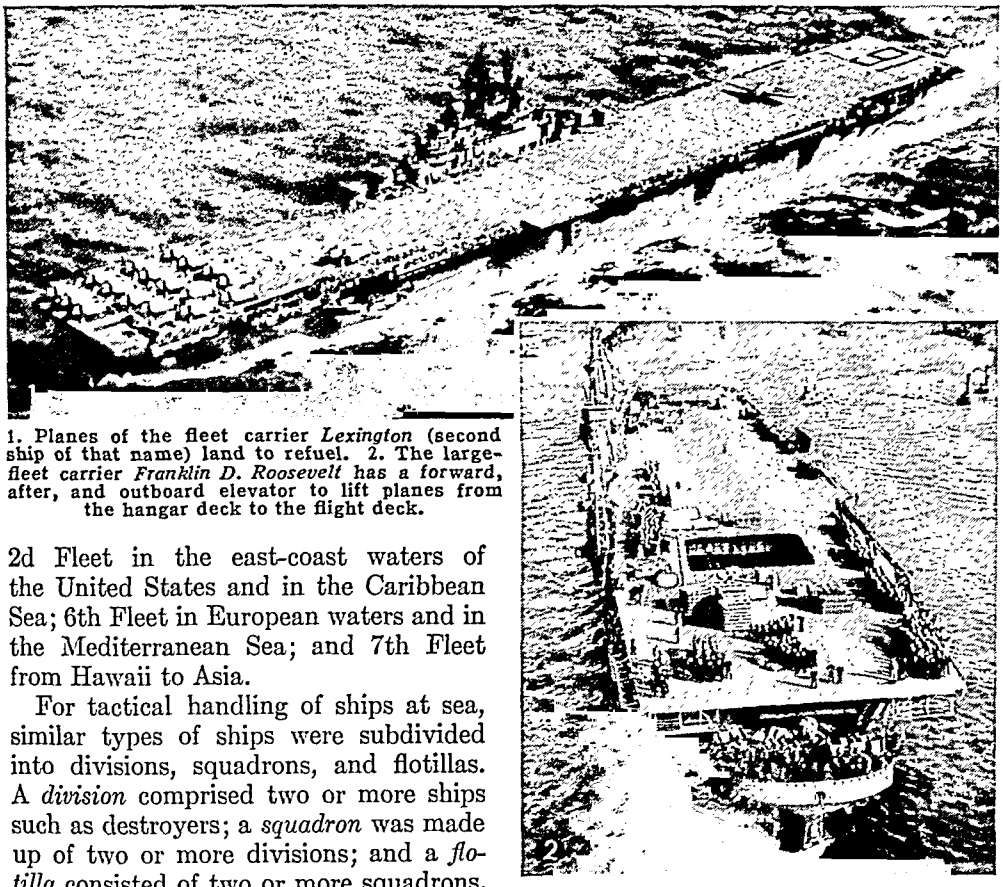
In 1946 the Navy divided all its fighting forces into two huge groups called the Atlantic Fleet and the Pacific Fleet. Each fleet consisted of all the vessels, aircraft, and shore establishments in its area. Under these were smaller but more compact forces called the 1st, 2d, 6th, and 7th fleets. The normal position of these fleets were: 1st Fleet in the vicinity of the United States west coast and Hawaiian Islands;

ONE OF A CARRIER'S DEADLY FLOCK



The Mauler (AM-1) attack plane serves as a carrier-based torpedo and dive bomber. It is carrying three 2,200-pound torpedoes and twelve 250-pound bombs. Jutting from the front edges of the wings are four 20-mm. aerial cannon.

TWO OF THE NAVY'S HUGE FLOATING AIR BASES



1. Planes of the fleet carrier *Lexington* (second ship of that name) land to refuel. 2. The large-fleet carrier *Franklin D. Roosevelt* has a forward, after, and outboard elevator to lift planes from the hangar deck to the flight deck.

2d Fleet in the east-coast waters of the United States and in the Caribbean Sea; 6th Fleet in European waters and in the Mediterranean Sea; and 7th Fleet from Hawaii to Asia.

For tactical handling of ships at sea, similar types of ships were subdivided into divisions, squadrons, and flotillas. A *division* comprised two or more ships such as destroyers; a *squadron* was made up of two or more divisions; and a *flotilla* consisted of two or more squadrons.

In order to provide better coördination in the armed services Congress passed the National Security Act of 1947. It established a new secretary of defense and created a Department of the Air Force, co-equal with the Army and Navy. The Navy, however, retained its own air arm including carrier- and land-based aircraft. The Marine Corps also kept its own aviation branch (*see* United States Government).

Ships That Make Up a Modern Navy

THE NAVY builds many different types of ships to accomplish its various tasks. Each type is constructed to fulfill a specific duty. In modern naval warfare hard-hitting planes make aircraft carriers the most powerful ships on the sea. Other members of the fighting team are battleships, cruisers, destroyers, submarines, and amphibious landing craft. To augment or service these types the Navy uses mine layers, mine sweepers, tankers, supply ships, patrol craft, and other fleet auxiliaries.

The Fighting Aircraft Carriers

The aircraft carrier is a vessel with a long flat deck covering its whole upper surface. Planes with landing wheels can land on and take off from this flight deck. When the deck is covered with planes, the first planes are launched by catapult. The ship is maneuvered from an *island* superstructure at the starboard (right) edge of the flight deck.

An aircraft carrier is essentially a floating air base which provides the landing field, all necessary aircraft supplies, repair facilities, and living quarters and food for the aviators as well as for the carrier crew. It is an air base that can move at high speed anywhere on the ocean and can operate its planes wherever they are needed.

The largest carriers are protected by armor at vulnerable spots, but other carriers have none. As in most Navy ships, their hulls are divided into many watertight compartments. The hull or flight deck may be pierced by gunfire, bombs, or torpedoes. By closing off the damaged compartment the crew can localize the harm and thus keep the ship afloat.

The Navy has five general types of carriers—attack, large fleet, fleet, light fleet, and escort. The newest and largest type is the fast attack carrier which is more than 1,000 feet long and displaces about 60,000 tons. The first ship of this type, the *Forrestal*, was scheduled for launching late in 1954.

Next in size are the three large-fleet carriers—the *Midway*, *Franklin D. Roosevelt*, and *Coral Sea*. Each of these ships displaces 45,000 tons and carries 137 aircraft, including fighter and attack planes. Such carriers have a complement of 4,085 officers and enlisted men and can make a speed of 33 knots. Their chief armament consists of 18 "5-inch-54" antiaircraft guns. (In naval usage both the caliber, or bore, and the length of the barrel may be given. Here the caliber is 5 inches and the length 5 times 54 or 270 inches.) In addition, they carry 84 40-mm. and 82 20-mm. guns, also for use against aircraft.

The third largest type is the fleet carrier, or *Essex* class. These ships displace 27,100 tons and carry about 100 planes. Some ships of this class have been converted to carry faster, heavier jet aircraft.

Most of the light-fleet carriers belong to the *Independence* class. They were originally built on cruiser hulls and carry 45 aircraft. Fleet and light-fleet carriers have speeds of about 33 knots.

The escort type was built on merchant ship hulls as a makeshift to get carriers in a short time. A total of 79 were completed of three major classes—the *Commencement Bay*, the *Casablanca*, and the *Bogue*. Escort carriers had speeds varying from 16 to 20

knots and carried 21 to 36 planes. They were nicknamed "jeep carriers" or "baby flattops."

When planes land or take off, carriers head into the wind. The force of the wind plus the ship's speed creates a "wind over the deck" which enables the planes to use the short run afforded by the deck. For landing, planes are equipped with a hook which can be lowered to engage the cross wires of *arresting gear.* This stops the plane in a very short distance. Emergency *barriers* of heavy wire rope are also provided to stop planes that fail to engage the arresting gear.

During the second World War carriers were equipped with fighter planes, torpedo planes, and dive bombers. The aircraft were armed according to the missions they were to perform. Their armament consisted of light, medium, and heavy bombs, torpedoes, 50-caliber machine guns, 20-mm. cannon, and rockets varying from 6 to 12 inches in diameter. The development of rockets armed the planes with projectiles as speedy as those fired from the biggest guns on a surface ship.

Types of Naval Aircraft

Naval aircraft are now divided into five separate classes, each designated by a letter symbol. They are:

V—Heavier-than-air (fixed wing)
H—Heavier-than-air (rotary wing)
K—Pilotless
M—Guided missiles
Z—Lighter-than-air

For combat operations the most important of these classes is the "V." These planes are subdivided into fighter (F), attack (A), patrol (P), observation (O), and transport (R). In designating such planes the Navy usually drops the "V" and adds a letter to represent the name of the airplane manufacturer. Most planes also carry a number to describe the type of model. Thus the F3D is a fighter plane, and it is the third such model produced by the Douglas Aircraft Company. Like the Air Force, the Navy also gives each type of plane a name. For example, the F3D is called the "Skyknight."

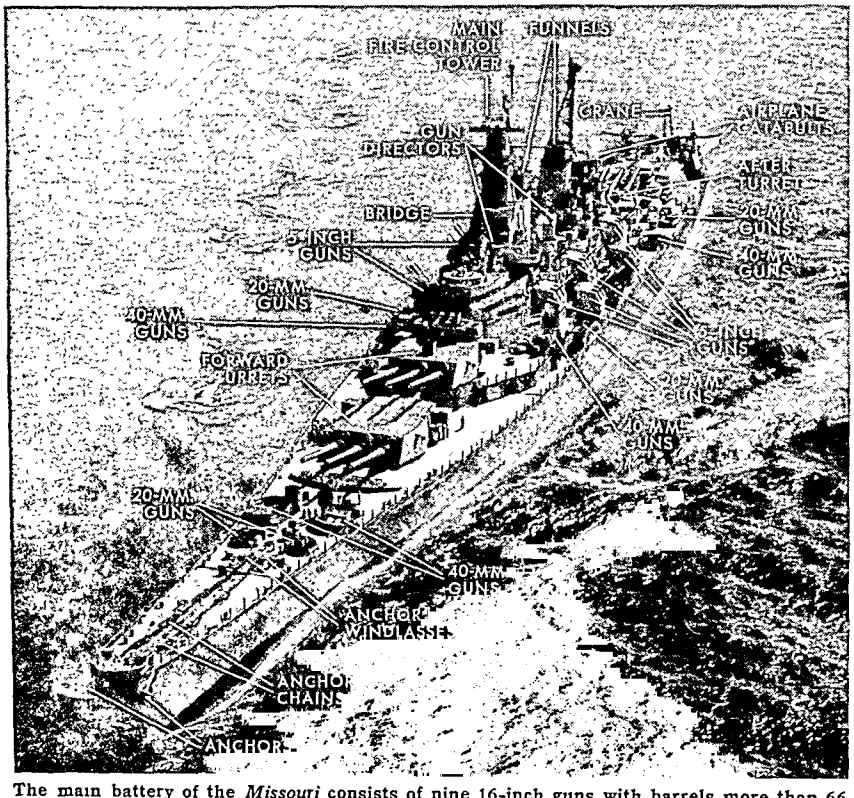
Navy fighter planes carry out missions similar to the fighters of the Air Force. Attack planes operate much as the light bombers of the Air Force (*see* Air Force). They are usually armed with 20-mm. guns, five-inch rockets, and two or three 2,000-pound bombs or 1,300-pound (11.75-inch) "Tiny Tim" aircraft rockets. After the second World War many fighter and attack planes were powered by jet propulsion or turbojet propulsion (*see* Jet Propulsion). Some of these fighters such as the Panther (F9F) and the Banshee (F2H) could attain speeds up to 650 miles an hour.

Patrol planes operating from shore bases are usually multi-engine planes able to fly great distances. One of them, a Neptune (P2V) called the "Truculent Turtle," set a world's record for long-distance flight in 1946. It flew 11,236.6 miles from Perth, Australia, to Columbus, Ohio, in 55 hours, 15 minutes. Patrol planes are used chiefly for scouting and for antisubmarine warfare. Most models are equipped with electronic devices for locating submarines.

For combat, a Neptune is armed with 6 20-mm. cannon, 4 .50-caliber machine guns, 16 5-inch rockets, and an 8,000-pound bomb load (usually 2 2,165-pound aerial torpedoes and 12 325-pound depth charges carried in the bomb bay). Patrol planes may be seaplanes for landing on the water, land planes with conventional landing gear, or amphibious planes able to land on either land or water. Seaplanes are sometimes serviced by ships called *seaplane tenders.*

For fighting duty, the fighters and attack planes on a carrier are divided into *squadrons* of 18 planes,

THE ARMAMENT AND ARMOR OF A BATTLESHIP



The main battery of the *Missouri* consists of nine 16-inch guns with barrels more than 66 feet long. Their fire is directed from the main fire-control tower. Light planes, launched from the catapults, help observe and direct fire. The antiaircraft battery comprises 5-inch and 40- and 20-mm. guns. The hull is protected by armor from 16 to 19 inches thick. Turrets and the upper and main deck are less heavily armored.

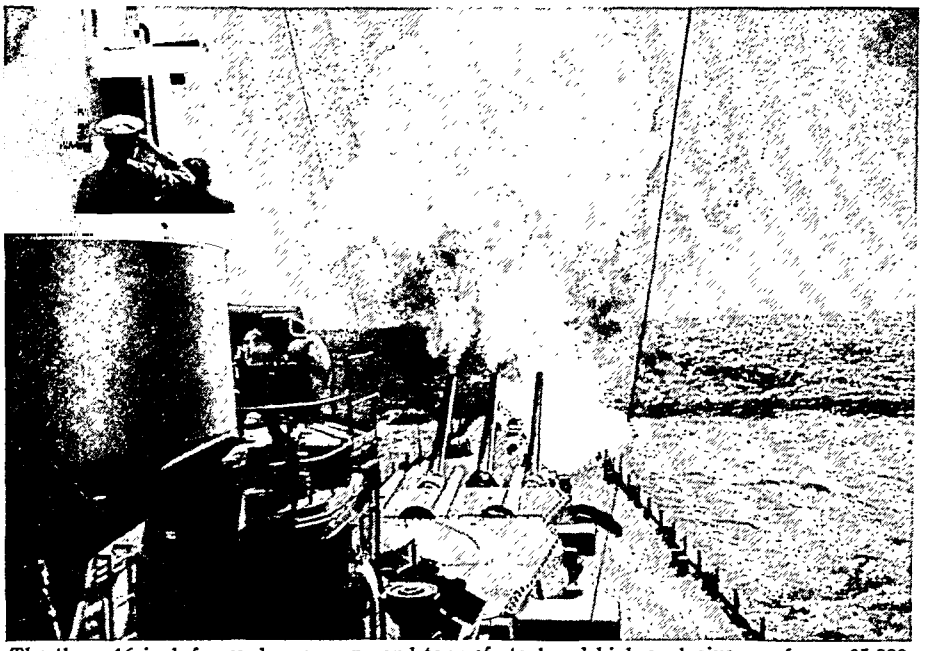
directed by a commander or lieutenant commander. A large-fleet carrier normally carries three squadrons of fighters and two of attack planes. All the planes on a carrier make up a *group*, usually under a commander.

Land-based patrol planes are also divided into squadrons. In peacetime, three or more squadrons make up a *fleet air wing*, commanded by a rear admiral. For combat, this unit is called a *patrol wing* and it is commanded by a captain.

After the second World War battleships and cruisers began carrying helicopters instead of light, fixed-wing planes. These aircraft perform scouting duty and direct long-range gunfire.

Transport planes are the cargo- and troop-carrying planes of the Fleet Logistic Air Wings. These large planes carry men and supplies from shore bases to the fleet in the battle zone. The Navy also uses nonrigid airships (blimps), dirigibles, and helicopters for patrol and rescue work. (*See also* Airplane; Balloon.)

THE 'NORTH CAROLINA' FIRES A SALVO



The three 16-inch forward guns can send tons of steel and high explosives as far as 35,000 yards (nearly 20 miles). The photograph shows the blast from the muzzles as a white and gray cloud. It is really glowing flame, edged with brownish fumes.

The Decline of Battleships

After the first World War the average battleship displaced about 30,000 tons. When Germany and Japan started building new ships in the early 1930's, a trend set in toward even greater size. In 1939 Congress appropriated funds for starting construction of new battleships. Each cost more than 100 million dollars. By 1944, four such battleships were in service—the *Iowa*, *New Jersey*, *Missouri*, and *Wisconsin* (construction on a fifth, the *Kentucky*, was suspended).

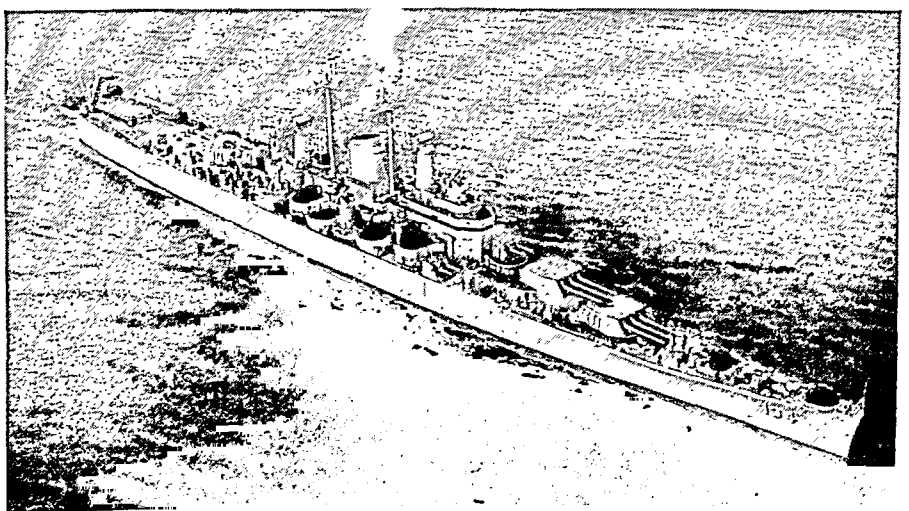
These huge vessels displaced 45,000 tons. They had armor from 16 to 19 inches thick at the sides and could make a speed of 33 knots. They carried 9 16-inch guns in their main batteries and 20 5-inch-38's for antiaircraft weapons. In addition they carried 80 40-mm. and 50 20-mm. guns for use against enemy aircraft. Their wartime complement was about 2,650 men. In 1950 the Navy had four other classes of battleships, all of smaller size and less heavily armored.

During the second World War airplanes replaced battleships as the decisive factor in naval engagements. By 1950 the Navy had decommissioned and laid up in protective coating "moth balls" all its 15 battleships except the *Missouri*. But when the *Big Mo* was sent to Korea to perform offshore bombardment, the Navy restored others to active service.

Closely related to the battleship is the battle cruiser. During the second World War, the Navy placed two such ships, the *Alaska* and the *Guam*, in service. (Construction on a third ship of this class, the *Hawaii*, was suspended after it was 84 per cent completed.)

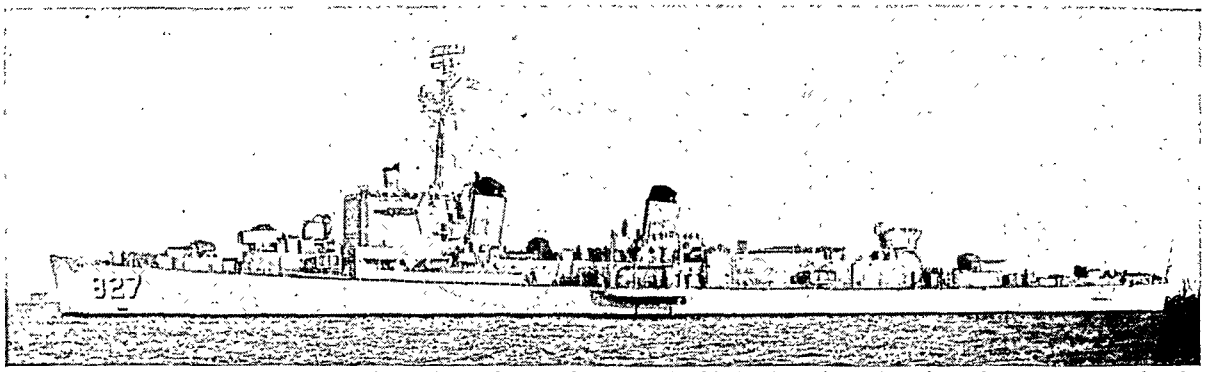
These were the first so-called battle cruisers built by any navy since 1921. They displaced 27,500 tons and carried more than 1,500 men. Their main armament was nine 12-inch guns and they had a speed

A HEAVY CRUISER UNDERWAY



The cruiser *Des Moines*, launched in 1948, can make a speed of 32 knots. For armament it carries 8-inch, 5-inch, 3-inch, and 20-mm. guns. This class of cruisers is the heaviest now in service in the world.

ALWAYS OUT IN FRONT AND READY TO FIGHT



One of the hunter-killer destroyers designed for antisubmarine warfare is the *Robert A. Owens.* Its equipment includes electronic aids for detecting submarines. Once the enemy submarine is located the destroyer releases a deadly barrage of depth charges.

of 35 knots. After the war these ships became part of the inactive reserve fleet.

Cruisers—Heavy and Light

Cruisers are smaller and usually faster than battleships. After the disarmament conference at Washington in 1921 cruisers were divided into two classes. *Heavy cruisers* carried guns of 8-inch caliber or larger. *Light cruisers* carried guns smaller than 8 inches.

Since the second World War, cruisers have been assigned the primary mission of protecting carriers against air attack. In this role they have become the Navy's second most valuable fighting ship. Cruisers are also effective in close shore bombardment.

In 1948 and 1949 the Navy completed three "superheavy" cruisers, the *Des Moines, Newport News,* and *Salem.* These ships displaced 17,000 tons and had a complement of 1,860 men. They were the first vessels to mount fully automatic, rapid-fire 8-inch guns. Their 5-inch-38's, mounted in six twin turrets, are dual purpose—that is, they can fire against either surface or aerial targets. Of the same ship size but faster and less heavily armed is the *Northampton,* commissioned in 1953. This was a new type of cruiser specially equipped to serve as a command vessel for task forces. It has a speed of 33 knots and carries four 5-inch-54's and eight 3-inch-70's.

Included among the Navy's light cruisers are those of the *San Diego* class, designated as antiaircraft cruisers (CLAA). These vessels bristle with dual-purpose 5-inch-38's and 40- and 20-mm. antiaircraft guns. Most of these ships also carry eight 21-inch torpedo tubes in quadruple deck mountings. The speedy CLAA's displace only 6,000 tons in contrast to the 14,700 tons displaced by the light cruisers *Roanoke* and *Worcester,* both completed in 1947. These "lights" have a speed of 32 knots and are armed with 12 6-inch (semiautomatic) and 12 3-inch (rapid fire) dual-purpose guns. They also carry 68 40-mm. and 12 20-mm. antiaircraft guns.

Destroyers, "PT" Boats, and Submarines

The "big ship" navy fights with planes or heavy guns. In contrast, the vessels of the "small ship" navy fight with torpedoes, bombs, rockets, or mines (*see* Torpedoes and Mines; Rockets).

DESTROYERS SPREADING A SMOKE SCREEN



To make a smoke screen these destroyers are spreading a harmless smoke from chemical smoke generators. Wind carries the smoke and envelops the larger ships in the convoy. Within a few minutes destroyers can hide an entire fleet from the enemy.

Destroyers, called "cans" by Navy men, are used today in large numbers in all the principal navies. They are the "work horses" of the sea. Destroyers are found in antisubmarine screens of all task forces and convoys. They transfer mail, passengers, and minor supplies between ships at sea and give antiaircraft support against air attack. They deliver torpedo attacks against surface ships (principally at night), lay smoke screens, and fight enemy submarines with gunfire and depth charges. They may also rescue aviators adrift at sea after their planes have been shot down.

The displacement of a modern American destroyer ranges from 1,700 to 2,500 tons, and its speed from 36 to 41 knots. A

destroyer is armed with antiaircraft machine guns up to 40 mm. in caliber, and its main batteries of 3-inch to 5-inch-38's are dual purpose. Some destroyers carry a multiple rocket projector in place of a forward 5-inch gun. The torpedo armament usually includes ten 21-inch tubes.

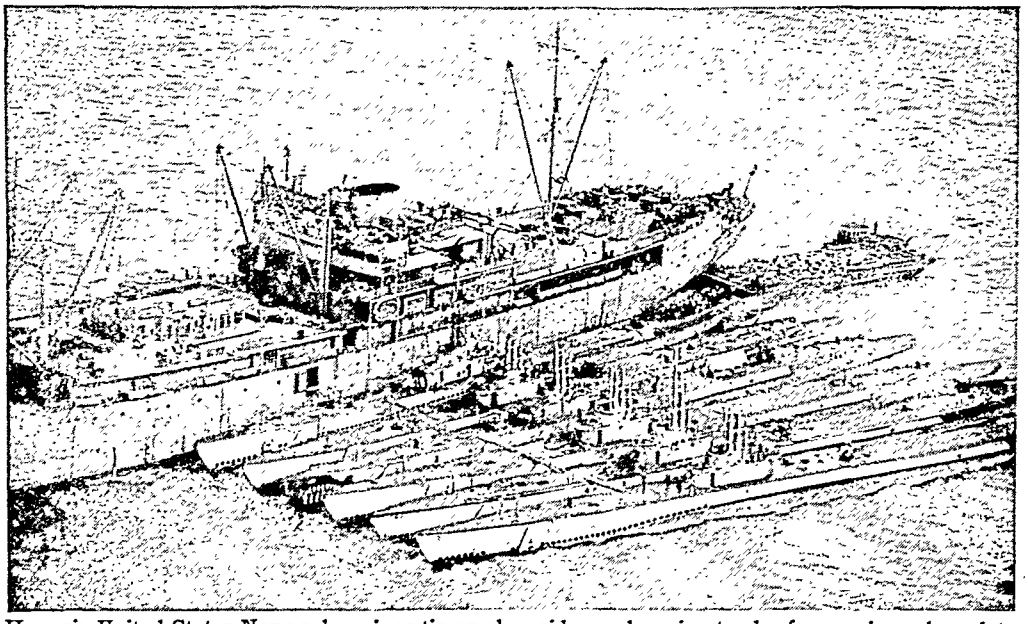
For safety the thin-hulled destroyer depends on speed rather than on its fire power. The ship can steam 6,000 miles without refueling.

Today the Navy has four types of destroyers. The most numerous class is the plain *destroyer* (DD). *Radar pickets* (DDR) have additional radar equipment in place of the customary torpedoes. *Escorts* (DDE) are large "sister" ships of the destroyer-escorts used during the second World War. (These wartime DE's are now classified as patrol vessels.) Sometimes called "hunter-killers," escorts seek out and destroy enemy submarines. The newest and biggest destroyers are the *leaders* (DL). Heading this class is the DL-1 *Norfolk*, which displaces 5,500 tons. It was originally laid down as a cruiser. Four DL's of the *Mitscher* class (3,650 tons) were launched in 1952.

In the second World War wooden-hulled motorboats, called PT (patrol torpedo), or *mosquito*, boats, were driven by three engines at speeds up to about 40 knots. These boats attack enemy ships by dashing in to close range and firing one or two torpedoes. For defense, they have only machine guns, plus their speed and ability to maneuver. In 1951 the Navy began building PT boats with aluminum alloy hulls, powered by four engines. Bigger and faster than the wartime models, they carry a crew of two officers and 12 enlisted men.

Submarines, like destroyers, rely on the torpedo for their attacking power. A submarine tries to approach unseen to within torpedo range of its target. This is hard to accomplish when the target is protected by destroyers equipped with underwater detection devices. The submarine therefore has only limited value in fleet action. It is extremely dangerous, however, when it can lie in wait in a narrow waterway through which the enemy must pass. It is dangerous also to damaged warships trying to get to port and to merchant ships. The submarine is called the "lone wolf" of the seas because it usually operates alone. In the second World War, however, they occasionally worked in groups called "wolf packs."

A SUBMARINE TENDER AND ITS BROOD

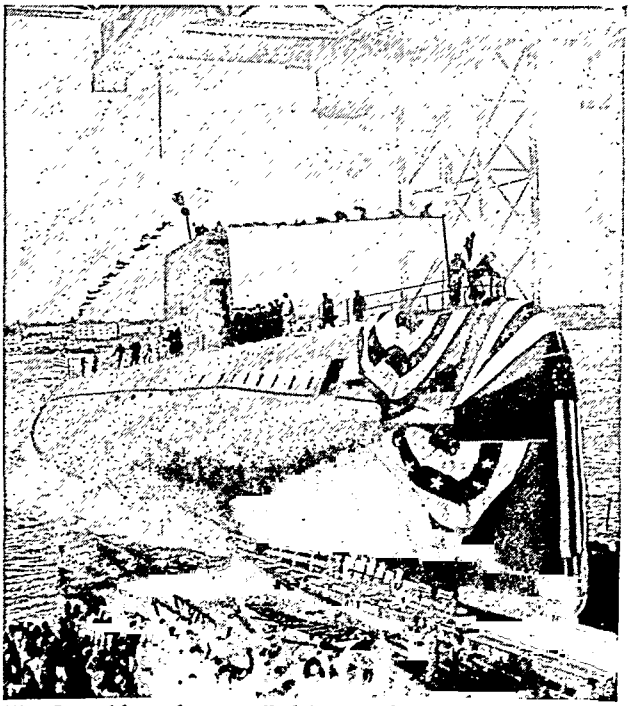


Here six United States Navy submarines tie up alongside a submarine tender for repair work and to take on supplies. Tenders also serve as communication and intelligence centers. In a combat zone tenders usually meet and serve submarines in friendly waters.

A new era in the history of sea power began in 1954 with the launching of the atomic-powered submarine, the *Nautilus*. The second submarine to use nuclear power was the *Sea Wolf*. Their construction details and capabilities were closely guarded secrets.

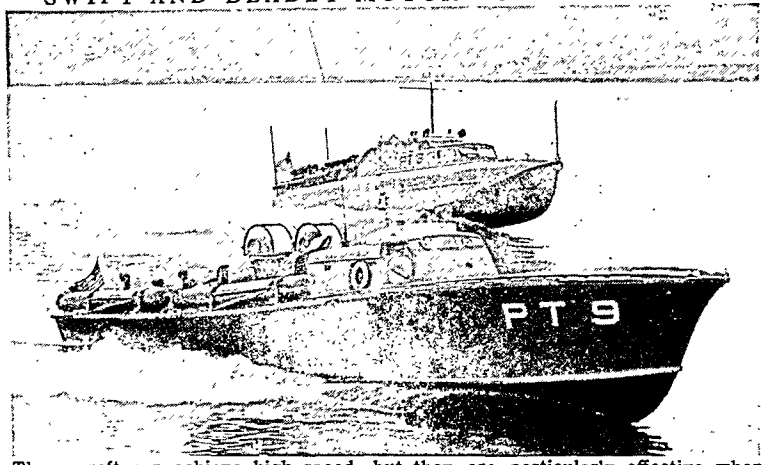
Submarines of the *Corsair* class, which have conventional engines, can dive to a depth of 600 feet. They displace 1,570 tons and can make a surface speed of about 21 knots. They carry a 75-man crew. In

WORLD'S FIRST ATOMIC-POWERED SUBMARINE



The first ship to be propelled by atomic power, the *Nautilus*, was launched in 1954 at Groton, Conn. Its submerged speed is estimated at more than 20 knots.

SWIFT AND DEADLY MOTOR TORPEDO BOATS



These craft can achieve high speed, but they are particularly effective when running slowly with muffled engines in darkness. By such a stealthy approach they can fire their torpedoes at close range. They then turn tail quickly and escape in the confusion that follows unexpected attack.

1951 the Navy launched the *Tang* and the *Trigger*, the first of a new class (K-1) of *killer* submarines designed to destroy enemy submarines.

A submarine's crew is made up entirely of volunteers. To be accepted for submarine duty, a man must have a physical and mental constitution which can withstand the strain of long periods of constant yet unseen danger. (*See also* Submarine.)

Small Fighting Vessels

A host of smaller ships assist larger ships and submarines in their tasks. Some small ships are designed to attack and destroy enemy submarines. Other ships are equipped to protect friendly harbors and the ships moored in them. Still others are made to land fighting forces and equipment on enemy shores.

Several different types of *submarine chasers* are used. They carry sonar equipment to detect and track submerged submarines. They are also equipped with depth charges and launching devices to attack enemy undersea craft. A three-inch deck gun is generally mounted for use against surfaced submarines. Machine guns give protection against air attack. Submarine chasers are powered with Diesel engines and can travel at from 14 to 20 knots. One type is constructed of wood. Scores of these vessels and other craft formed a "splinter fleet" which helped to cripple the German U-boat threat in the second World War.

Net layers place antitorpedo nets wherever needed to ward off submarine attacks. *Mine layers* are vessels equipped to lay explosive mines in areas where an enemy may be expected. They may be of contact, antenna, magnetic, or acoustic type (*see* Torpedoes and Mines). *Mine sweepers* are used to sweep up enemy mines with special sweeps, or "paravanes."

In the second World War the United States suffered the military disadvantage of having to land its armies on far-off hostile shores. This it did by means of landing craft which brought men, weapons, and supplies ashore in joint army-navy amphibious operations. Most of these amphibious craft had flat bottoms and could be grounded on a beach shelf. When the huge bow doors were opened they provided a ramp to the shore. Thus troops and even heavy equipment could unload rapidly. These operations were often carried out in the face of heavy enemy fire.

The chief types of landing craft are:

Landing Vehicle, Tracked (LVT)—an amphibious tractor, the treads of which can swim or climb beaches; known as the "Alligator." LVT(A) is an armored tractor.

Landing Craft, Vehicle, Personnel (LCVP)—about 36 feet long; used mainly from ship to shore for landing infantry and light vehicles.

Landing Craft, Medium (LCM)—used from ship to shore to land tanks, troops, supplies.

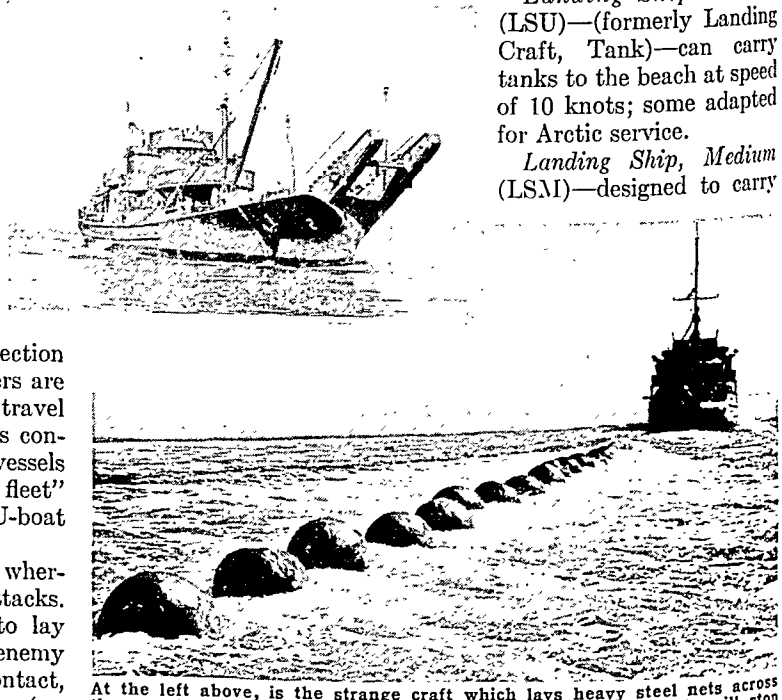
Landing Craft, Support (LCS)—lightly armored craft mounting machine guns from .50 caliber to 40 mm., also rockets, to augment the landing fleet's firepower.

Landing Craft, Infantry (LCI)—158 feet long, 400 tons; has accommodations for 25 crew and 210 troops; powered by Diesel engines.

Landing Ship Utility (LSU)—(formerly Landing Craft, Tank)—can carry tanks to the beach at speed of 10 knots; some adapted for Arctic service.

Landing Ship, Medium (LSM)—designed to carry

LAYING AN ANTITORPEDO NET



At the left above, is the strange craft which lays heavy steel nets across the mouths of harbors or around anchored warships. The nets will stop any torpedoes fired by enemy submarines. At the bottom is a stern view of the vessel as it hauls the float-supported net in its wake.

mechanized equipment. Has a speed of 12 knots and a complement of 59. LSM (R), for rocket, is larger. Armed with many rocket projectors, four 4.2-inch mortars, and antiaircraft guns.

Landing Ship, Tank (LST)—about 382 feet long, 6,000 tons fully loaded; delivers tanks, trucks, etc., through a bow ramp.

Landing Ship, Dock (LSD)—a 450-foot dock; can cross ocean under its own power; used for further unloading after a beachhead has been secured.

Personnel of the Navy

THE PRESIDENT of the United States is commander in chief of the Navy, Army, and Air Force. He exercises direct command through a member of the Cabinet, the secretary of defense. Under this official is a civilian secretary of the navy, assisted by an undersecretary and two assistant secretaries. One of these is designated the assistant secretary for air.

In charge of all operating forces is the chief of naval operations (CNO), the highest military command in the Navy. His principal assistants are the vice-chief of naval operations, the naval inspector general, and five deputy chiefs in charge of personnel, administration, operations, logistics (supply), and air. Other assistants are the judge advocate general, the heads (chiefs) of the shore-based bureaus, and the commandant of the Marine Corps (*see* Marine Corps).

Commissioned Officers of the Navy

Navy officers are either *line* or *staff*. Line officers are qualified for leadership in naval combat. Staff officers are specialists in such fields as supply, medicine, and dentistry. Commissioned officers of the line begin their careers as ensigns after graduation from the Naval Academy or a university with special naval training (*see* Naval Academy). Officers are promoted under a system started in 1916. This program maintains the following percentages by ranks for each 100 officers: rear admirals, 1; captains, 6; commanders, 12; lieutenant commanders, 18; lieutenants, 25; lieutenants (junior grade) and ensigns, 38.

A captain in command of a large ship has a commander as executive officer and several commanders or lieutenant commanders as *department heads*. These are the operations officer, the gunnery officer or the first lieutenant, the medical officer, the dental officer, and the supply officer. Some ships also have an air officer and others a repair officer. Enlisted personnel are grouped into divisions under a lieutenant or lieutenant junior grade. Ensigns (called junior officers) assist these division officers.

Warrant Officers and Enlisted Men

In addition to the officers, who hold their commissions from the president, the Navy also has *warrant officers*. These men are specialists, appointed by the secretary of the navy. They are selected by competitive examinations from among the highest enlisted grades. After serving six years as warrant officers they are eligible for promotion to chief warrant officers. This is a commissioned grade ranking just below that of ensign. Chief warrant officers may eventually earn pay and allowances equal to those of a lieutenant commander.

Enlisted recruits must be 17 to 31 years old and unmarried for their first enlistment ("hitch"); the usual term is four or six years. Recruits are trained at naval-training centers ("boot camps"). They may advance through the grades of recruit, apprentice seaman, and seaman to petty officer. There are four classes of petty officers from 3d class to chief.

Men may be trained as electricians, radiomen, photographers, motion-picture technicians, ordnancemen, machinists, metalworkers, woodworkers, deep-sea divers, cooks, musicians, clerks, journalists, or as various other specialists. Aviation training is also open to selected candidates.

Base pay begins at $75 a month for recruits and rises to $198.45 for chief petty officers on permanent appointment. Additional pay is based upon length of service, hazardous duty, and sea duty. (For pay of all ranks, *see* Army.) Each man receives a clothing allowance and free food, quarters, and medical care. He may retire on half pay after 20 years or three-quarters pay after 30 years' service. (For picture of uniforms and insignia, *see* Uniforms.)

Naval Reserves and the WAVES

During emergencies the Navy adds to its strength by calling to active duty the officers and men of the Naval Reserve. This group consists of five reserve classifications. The *Fleet Reserve* is made up of officers and men of the regular Navy who have retired from active duty. The members of the *Organized Naval Reserve* attend regular weekly drills and take an annual two-week training cruise, both with pay. The *Volunteer Naval Reserve* consists of officers and men who may voluntarily receive training in small specialized units without pay. The *Merchant Marine Naval Reserve* is drawn from officers qualified to serve on merchant vessels. The *Naval Air Reserve* trains in flight operations at naval air stations.

The Coast Guard (under the Navy in wartime) and the Marine Corps have their own reserves (*see* Coast

NAVY RANKS AND APPROPRIATE COMMANDS

FLEET ADMIRAL. All naval operations in a particular theater of war.
ADMIRAL. The principal fleet or separate fleets.
VICE ADMIRAL. Major division of the fleet.
REAR ADMIRAL. A division of heavy ships, a flotilla of lesser ships, a naval district, or a task force.
COMMODORE (a wartime rank). A small force that warrants a "flag" officer but not an admiral.
CAPTAIN. A heavy ship, a squadron of destroyers, or a naval station.
COMMANDER. A destroyer, auxiliary ship, or a division of destroyers or submarines.
LIEUTENANT COMMANDER. A destroyer escort, submarine, or small auxiliary.
LIEUTENANT. Patrol craft.

The following officers do not ordinarily command vessels: lieutenant (j.g.), ensign, commissioned warrant officer, warrant officer.

NOTE.—For comparative ranks of army and navy officers, *see* the table with the Army article.

Guard). Many Navy and Marine Corps officers come from Naval Reserve Officers' Training Corps in about 52 universities. In emergencies, civilians are commissioned after several months of training. Enlisted men may be commissioned after passing examinations.

The second World War brought a great many women into the Navy. The WAVES (Women Accepted for Volunteer Emergency Service) were organized July 30, 1942. WAVES are trained for duty in shore establishments of the Navy, thereby releasing male personnel for combat duty. They hold regular ranks or ratings and receive regular pay. WAVES were not permitted to serve outside the continental limits of the United States until late 1944, when the first overseas contingent was sent to Hawaii.

Two other organizations of women served with the Navy in the second World War: the SPARS (Women's Auxiliary Reserve, Coast Guard), created Nov. 23, 1942; and the Marine Corps Women's Reserve, established Feb. 15, 1943. Both the WAVES and women marines became part of the regular Navy in 1948.

BAKING NAVY PIES



The Navy trains thousands of expert bakers and cooks to feed its hungry sailors economically but well.

The Navy's Fighting Builders

The construction battalions—popularly known as the "Seabees"—build naval shore establishments overseas for the Navy. Prior to the second World War, this work was done by civilians. But after the loss of American bases at Guam and Wake Island the Navy wanted men who could both build and fight.

The Seabees were organized Dec. 28, 1941, with an authorized strength of 3,300. This original force grew to more than 250,000 during the war. Members of this branch are recruited from civilians between the ages of 17 and 50. Their ranks contain workers from scores of trades and professions.

Seabees pride themselves on being able to build or repair anything in any locality. They construct roads, piers, airfields, gun emplacements, fortifications, machine shops, power plants, barracks, and other buildings at shore bases. They install telephone systems, distilling units, and fueling depots. Seabees are usually divided into battalions composed of several construction companies. They train at Port Hueneme, Calif., their headquarters, and at Little Creek, Va.

The Navy's Shore Establishments

THE SEA and air activities of the Navy are supported by many offices, yards, and other shore installations. These establishments are controlled by the office of the secretary of the navy, the chief of naval operations, and several bureaus.

The *Bureau of Naval Personnel* directs the Naval Academy, the Naval War College, and the procurement, training, and assignment of officers and enlisted men. It maintains training centers for recruits at Newport, R. I., Norfolk, Va., Great Lakes, Ill., and San Diego, Calif. The *Bureau of Ordnance* produces naval guns and explosives. It maintains a naval gun factory in Washington, D. C., a powder factory in Indianhead, Md., a proving ground at Dahlgren, Va., torpedo stations at Newport, R. I., and Keyport, Wash., and a mine depot at Yorktown, Va.

The *Bureau of Yards and Docks* constructs and maintains naval shore establishments. It also directs the Seabees and other units of the Civil Engineer Corps.

The *Bureau of Ships* designs all naval vessels and supervises their building and repairs. The *Bureau of Aeronautics* has a similar responsibility for naval aircraft. It directs flight training at Pensacola, Miami, and Jacksonville, Fla., and at Corpus Christi, Tex. It also maintains an aircraft factory at Philadelphia, a lighter-than-air craft base at Lakehurst, N. J., and air stations at Quonset Point, R. I., Norfolk, Va., the Panama Canal Zone, San Diego and Alameda, Calif., Seattle, Wash., on Oahu in the Hawaiian Islands, and other places.

The *Bureau of Supplies and Accounts* is the Navy's purchasing agent, bookkeeper, storekeeper, and paymaster. The *Bureau of Medicine and Surgery* directs the naval hospitals, hospital ships, and medical and sanitation work throughout the Navy. It also trains naval doctors, hospital corpsmen, and the Navy Nurse Corps. Since 1949 the *Military Sea Transportation Service* has provided overseas transportation for all the armed forces.

For administrative purposes the continental United States is divided into ten naval districts. The district headquarters are at Boston; New York City; Philadelphia; Norfolk, Va.; Charleston, S. C.; New Orleans; Great Lakes, Ill.; San Diego; San Francisco; and Seattle. Outside the United States, district headquarters are at San Juan, Puerto Rico; Pearl Harbor, Hawaii; Balboa, Canal Zone; and Kodiak, Alaska.

The Peacetime Navy Prepares for War

BEFORE the United States entered the second World War, the strength of the Navy was less than 300,000 men and 320 combat ships. During the war it grew to more than 4,000,000 men, including the Marine Corps and Coast Guard, and it operated a two-ocean force of about 1,160 warships. By 1945 the United States was the greatest sea power in the world. But in the first few years of peace it demobilized most of its man power and laid up many fighting vessels in "moth balls."

When North Korean Communists invaded South Korea in 1950, President Truman ordered the Navy to help defend South Korea and to protect Formosa from invasion by Chinese Communists. At that time the

personnel strength of the Navy was about 375,000, with only 573 ships in service. The Navy quickly doubled its personnel strength and added about 500 ships to the fleet by new construction and by taking vessels out of "moth balls." It also increased its air arm by more than 1,000 planes. During the Korean war Navy warships fired more than 75,000 tons of ammunition at enemy coastal positions. At the same time Navy and Marine aircraft flew more than 250,000 combat sorties. (*See also* Marine Corps.)

The History of Navies and Sea Fighting

THE ANCIENT Mediterranean peoples fought wars on water almost as soon as they learned to travel on it. Their warship was the *galley*, a small vessel propelled by rowers who sat in one or more banks, or tiers. Later galleys had auxiliary sail power (*see* Ships). Galleys fought by ramming enemy ships with metal beaks on their prows or by grappling them so that troops could fight man to man with swords and knives.

Naval artillery was used in the great battle of Actium (31 B.C.) by Antony against Octavian. His "guns" were crude spring-operated machines mounted on wooden towers on the upper decks. They threw stones and darts. But Antony's artillery was not decisive. Octavian's more maneuverable ships and tactics won him the battle and made him the first Roman emperor.

The Byzantine Greeks in the Middle Ages improved their gunnery by hurling blazing masses of "Greek fire" at enemy ships. This was an incendiary mixture of sulfur, naphtha, and quicklime held in a large tube called a *siphon*. A heavy stream of water from a hose ignited the quicklime and hurled the flaming ball toward the enemy.

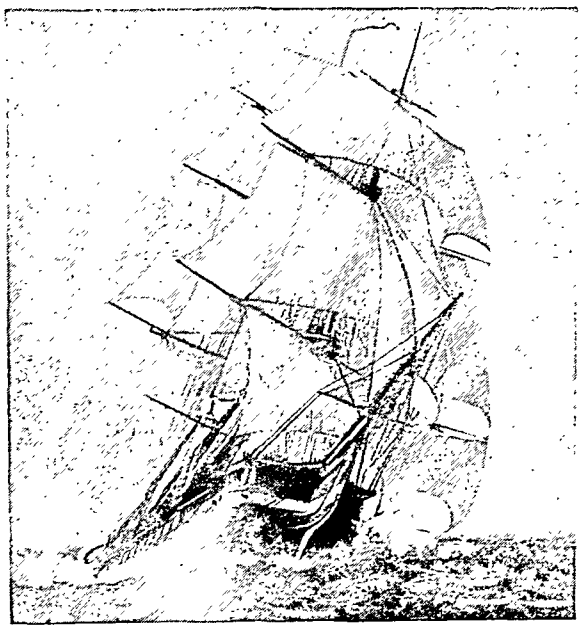
The old galley tactics figured in an important medieval sea victory: the destruction of Genoese sea power by the Venetians at Chioggia in 1380. They were used as late as 1571 when the fleets of Spain, Venice, and the Papacy defeated the Turks at Lepanto.

New Fighting Methods

But sail and cannon proved superior 17 years later when the English defeated the Spanish Armada (*see* Armada, Spanish). The Spaniards tried to catch the English vessels for hand-to-hand fighting; but they could do nothing against the English tactics of standing off and dueling with cannon.

Sailing ships armed with cannon reached their peak under Rodney, Nelson, and other great admirals of the English-French naval wars between 1775 and 1815. Their capital ship was the "ship of the line," carrying from 64 to 120 guns. The frigate, with 36 to 50 guns, was the cruiser of the period. Smaller ships included corvettes, sloops of war, and gunboats.

These ships fought chiefly with cannon, although boarding attacks were frequent. Then crews fought fiercely with muskets, hand grenades, and cutlasses. Battles between sailing fleets culminated with Nelson's famous victory over the French and Spanish fleets at Cape Trafalgar near the Strait of Gibraltar Oct. 21, 1805 (*see* Nelson). Thereafter no nation challenged the power of the British main fleet for more than a century, until the first World War.



"OLD IRONSIDES"

The 44-gun frigate, the *Constitution*, is the most famous ship in American history. She was launched Oct. 21, 1797. As Commodore Edward Preble's flagship she helped to bombard Tripoli in 1804. Under Capt. Isaac Hull, early in the War of 1812, she destroyed the British frigate *Guerrière*. This encounter brought her the name *Old Ironsides*, for when a shot fell harmlessly off her side a sailor cried out, "Huzza! Her sides are made of iron!" Condemned as unseaworthy in 1830, the old ship was rebuilt and served another 48 years. After 1897 it usually lay in Boston Navy Yard. Threatened with decay, it was rebuilt by public contributions between 1925 and 1931. In 1949 it was repaired extensively with ship timbers buried in a Florida swamp before the Civil War. Only about 8 per cent of the original material remained.

Beginnings of the American Navy

American naval history began with the Revolution, when the colonists sent out privateers to prey on British shipping. On Oct. 13, 1775, the Continental Congress appointed Silas Deane, John Adams, and John Langdon to fit out two warships. Later, more than a dozen ships were commissioned in the new navy. They won many battles under such commanders as John Paul Jones, John Barry, and Esek Hopkins. Hopkins was appointed commander in chief on Dec. 22, 1775, and led the first American fleet to sea on Feb. 17, 1776. In all, the Americans captured or sank 202 British war vessels and some 800 other ships.

Perhaps the most exciting sea fight of the war was the victory of the American *Bonhomme Richard* over the *Serapis* on Sept. 23, 1779. The decisive naval event, however, was the victory of the French fleet over the British fleet

AMERICAN SEA FIGHTERS OF THE CIVIL WAR



The Union navy saw much action in the Civil War. Here we see sailors and marines of the Union gunboat *Mendota* preparing to swab the barrel of their muzzle-loading cannon after firing. The action shown here took place on the James River in July 1864. The photograph was taken by the famous pioneer war photographer, Mathew B. Brady.

off Chesapeake Bay on Sept. 5, 1781. This victory helped force Cornwallis to surrender at Yorktown, since it prevented the British from escaping or from being relieved by sea. (*See also* Barry.)

After the war, the navy was disbanded. No United States naval force existed until Barbary pirates attacked American shipping. Congress was forced to act. It authorized on March 27, 1794, the building of six frigates: the *United States*, *Constitution*, *President*, *Chesapeake*, *Constellation*, and *Congress*. The *United States* was the first ship launched and so became the first vessel built by the young nation. The Navy Department was founded with the appointment of Benjamin Stoddert as its first secretary on April 30, 1798.

Exploits of the New Navy

The new ships performed well against France in 1799 and 1800 (*see* Adams, John). In 1803 and 1804 they compelled the Barbary States of North Africa to respect the United States. Among the great commanders of this time were Capt. Thomas Truxtun (1755–1822), victor in two hard-fought combats with French frigates; Capts. Edward Preble (1761–1807), Richard Dale (1756–1826), John Rodgers (1773–1838), and William Bainbridge (1774–1833), leaders in the fight against Tripoli; and Lieut. Stephen Decatur (*see* Decatur).

In the War of 1812, the United States had no ships of the line to use against the British main fleet; but American frigates proved vastly superior in fights between single ships. The designer of the frigates, Joshua Humphreys (1751–1838), gave them thicker sides and heavier guns than any British frigate; yet they equaled the British craft in speed and maneuverability. Instead of blazing away without aim as the British often did, the American gunners aimed each shot at the enemy's water line. Most frigate duels ended with the British ship a sinking wreck, while the Americans came off with little damage and loss of life.

In that war, Perry's victory on Lake Erie saved the Northwest Territory. Macdonough's victory on Lake Champlain prevented the invasion of New York and greatly influenced the terms of the peace (*see* Perry; War of 1812).

Transformation of Navies by Steam and Iron

The use of steam brought great changes to the world's navies, and new ships were being designed just at the start of the Civil War. One development was the steam-powered "ironclad" ship with one or more gun turrets (*see* Monitor and Merrimac). Naval activity during the war consisted largely of naval blockades of Confederate coasts, punctuated by spectacular exploits of Confederate blockade runners and by naval attacks on southern ports (*see* Blockade; Civil War, American; Farragut; Porter, David D.). Armored river boats also saw important action along the Mississippi, Cumberland, and Tennessee rivers.

After the war the United States Navy fell into decay. Foreign sea powers, after studying the ironclad monitor type, began building steel ships armed with breech-loading rifled guns. These foreshadowed the modern battleship. In 1883, under President Arthur, the United States began to build a modern navy. The new fleet struck powerful blows in the Spanish-American War (*see* Spanish-American War). Soon after, President Theodore Roosevelt started work on a strong battle fleet that laid the foundation for the present sea power of the United States.

In 1905 Britain launched the battleship *Dreadnought*. Hitherto, battleships were armed with four heavy guns in two turrets and a secondary battery

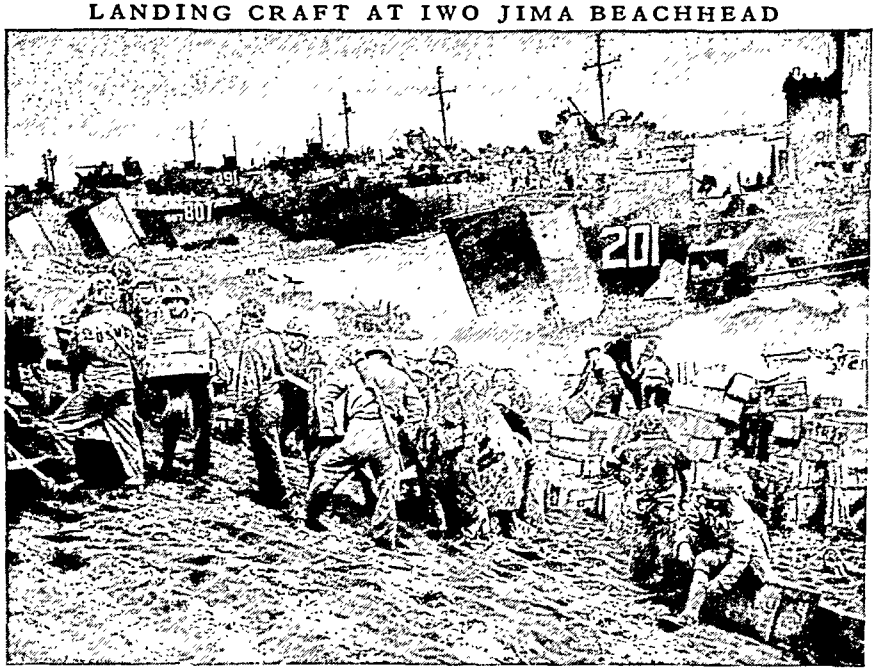
of smaller guns. The *Dreadnought*, with ten 12-inch guns in five turrets, compelled every navy in the world to rebuild. Germany especially began a huge shipbuilding program, a show of strength that helped start the first World War. (For naval events in this war, *see* World War, First.)

In 1911 the United States began experiments with naval aircraft by launching planes from the *Pennsylvania*. Britain built the first typical "flattop" carrier, the *Argus*, in 1918. The United States commissioned its first carrier, the *Langley*, in 1922.

Attempts to Limit Naval Strength

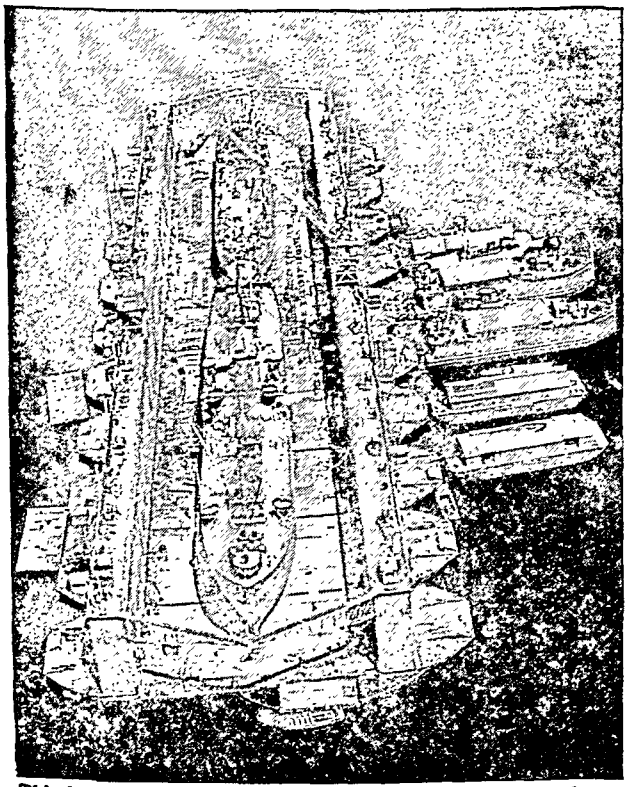
Hoping to prevent ruinous competition in naval building, President Harding called the Washington Conference of 1921–22. The result was a 15-year treaty which set up a 5–5–3 ratio for capital ships between the United States, Great Britain, and Japan, with a 1.67 proportion for France and Italy. No limit was placed on other types, except that none should be heavier than 10,000 tons or have guns larger than 8-inch caliber. President Coolidge failed to obtain further reductions by Japan and Britain at a Geneva conference in 1927. Later, limitations on smaller craft were accepted by the United States, Great Britain, and Japan at the 1930 London conference.

LANDING CRAFT AT IWO JIMA BEACHHEAD



These LST's—Landing Ships, Tanks—are pouring Marine troops, tanks, and supplies ashore during the bitterly contested battle for Iwo Jima in the second World War. These shallow draft ships were able to anchor within a few feet of the water's edge.

GIANT FLOATING REPAIR DOCK



This huge floating dry dock has raised two big ships, and now navy workmen are making repairs on their hulls. Dry docks like these can lift nearly 100,000 tons. They gave valuable aid in keeping ships of the second World War in fighting trim.

These treaties gave the leading powers enough strength for defense but not for attack. Japan received a lower ratio on the ground that distance would prevent American and British fleets from attacking Japan. All powers also agreed not to strengthen navy yards or fortifications within striking distance of Japan.

When Japanese action in Manchuria and China strained international relations, Japan announced that it would not renew the treaties after their expiration on Dec. 31, 1936. This refusal started a naval race. A new treaty signed by France, the United States, and Britain in 1936, and supplementary pacts between Britain, Germany, and Russia in 1937, set no quantitative limits, except for Germany. Germany renounced its agreement with Britain in 1939, shortly before the outbreak of war.

Preparation for War

When war broke out in 1939, the only navy equal in size to the United States Navy was the British. But the British navy was not so effective because Britain had to maintain strong fleets in the Orient, Mediterranean, and West Indies to protect possessions and trade routes. It was also weak in naval aircraft.

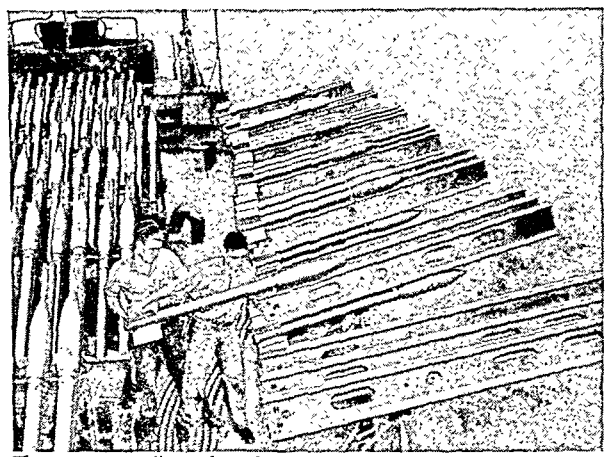
Next in strength was the Japanese navy with about seven-tenths the fighting strength of the United States fleet. It was stronger, however, than any force that could be sent into its home waters. Next came the French and Italian navies, each strong in new, light ships. The German navy was small, but modern and efficient. It specialized in submarines and "pocket" battleships—fast 10,000-ton ships with heavy

guns. The Netherlands had good ships and planes for colonial defense. Little was known of the Russian navy, but it was thought to be strong in submarines.

Until the United States and Japan entered the war, naval action consisted mainly of British efforts to maintain a blockade and German and Italian attacks to weaken the British navy and sink merchant shipping.

In 1940, Congress anticipated America's eventual participation in the war and authorized the construction of a two-ocean navy, strong enough to defeat any combination of enemies. The plan called for about 700 ships, totaling more than 3 million tons, to be completed by 1946. Actual construction during the war years far exceeded this. Spurred by wartime demands, United States shipyards built 8 new battleships, 48 cruisers, 27 aircraft carriers, 77 escort carriers, 349 destroyers, and hundreds of smaller combat and service craft.

DESTRUCTIVE ROCKET LAUNCHERS



Here we see sailors aboard a rocket ship loading rocket launchers. The launchers will be set off by an electric charge and throw a deadly barrage of rockets at the enemy. The fins at the tail of the rocket act like feathers on an arrow to keep the rocket steady in flight.

Sea Fighting in the Second World War

The job of the United States Navy in the second World War was to land and supply soldiers and marines on enemy-held shores—and to wipe out all opposition along the way. To accomplish these gigantic tasks, the navy employed fighting methods unknown in previous wars (*see* World War, Second).

One of these new techniques was carrier warfare. The airplane carrier and its planes appeared in every important sea battle and landing operation of the war. Naval aircraft engaged enemy planes in air duels; bombed, strafed, and torpedoed enemy ships; and bombed and "hedge-hopped" troops attempting to repulse Allied landings. Carrier planes at the battles of Coral Sea and of Midway, in 1942, won the first decisive Allied victories of the war in the Pacific and fought strenuously thereafter to lead the offensive.

Another new technique was amphibious warfare. In this method of landing troops on enemy beaches, the navy played many parts. First it had to clear the area for landing by bombarding the beaches, sweeping for mines, and removing beach obstacles. This last task was performed by daring groups of swimmers called "underwater demolition teams." They dived from small boats and swam under water to cut wire traps and plant explosive charges which blew up heavy barriers.

Then with special landing craft (listed on a previous page) the navy put the invasion forces and their equipment ashore. Once the troops were on land, the navy helped make their position secure by bombardment from the big guns of the capital ships and by support from carrier aircraft. Finally the navy continued to protect the sea supply routes and prevented the enemy from landing reinforcements. Such huge operations as the Normandy and Okinawa landings were conducted in this fashion.

Often fighting thousands of miles from land bases, the navy was able to keep its warships supplied and repaired in the combat areas. This task involved the use of floating dry docks and repair ships in harbors not far from combat areas, completely stocked supply ships, and a fleet of fast oilers.

After the war most of the fleet was put in reserve. The ships were moored in fresh-water anchorages, their readiness preserved by plastic covers over guns and motors and by dehumidifiers in the compartments.

Navies of the Future

Modern navies are now adopting destructive weapons that once existed only in the theories of forward-looking scientists. Perhaps the most important of these is the jet-powered rocket. This is a guided missile, launched from a surface ship or submarine. It may be controlled by a preset gyroscope or it may receive electronic signals from a guiding mechanism aboard ship.

Atomic energy may soon provide the power to keep ships at sea and submarines under sea for much longer periods, using only a fraction of the space now devoted to fuel-oil tanks. It may also provide the explosive charge, or "warhead," in rockets and torpedoes as well as in bombs. New electronic devices such as radar and loran are rapidly supplanting older methods for navigation and patrol work.

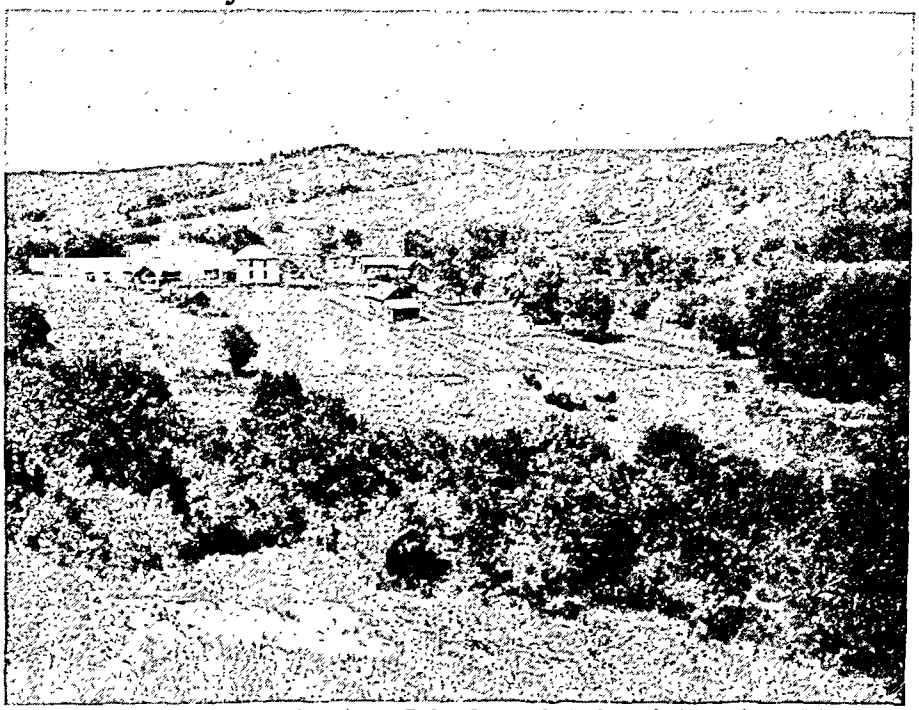
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The FERTILE PRAIRIES *of the* "CORNHUSKER STATE"

NEBRASKA. In eastern Nebraska well-tilled acres of corn and wheat and green pastures cover the gently rolling land. There cattle graze and hogs fatten. The tidy farmhouses and barns with trees planted near by give evidence of plenty and comfort gained through hard work, foresight, and thrift. This section of the state makes it one of the nation's great producers of cattle, corn, and other agricultural products.

Other parts of Nebraska present different pictures. Its area of 77,227 square miles, larger than all New England, has a great variety of scenery. Along the state's eastern border on the banks of the Missouri River steep bluffs show their varied outlines against the sky. In the north the Niobrara River flows for part of its course through rugged and picturesque canyons with pines, cedars, and numerous springs. In the extreme northwest corner is a small section of the Bad Lands of South Dakota. These have fantastic hills and terraces, and the fossil remains of prehistoric ages. Near the western border are hills that rise almost as high as some mountains. East of these foot-hills are tablelands.



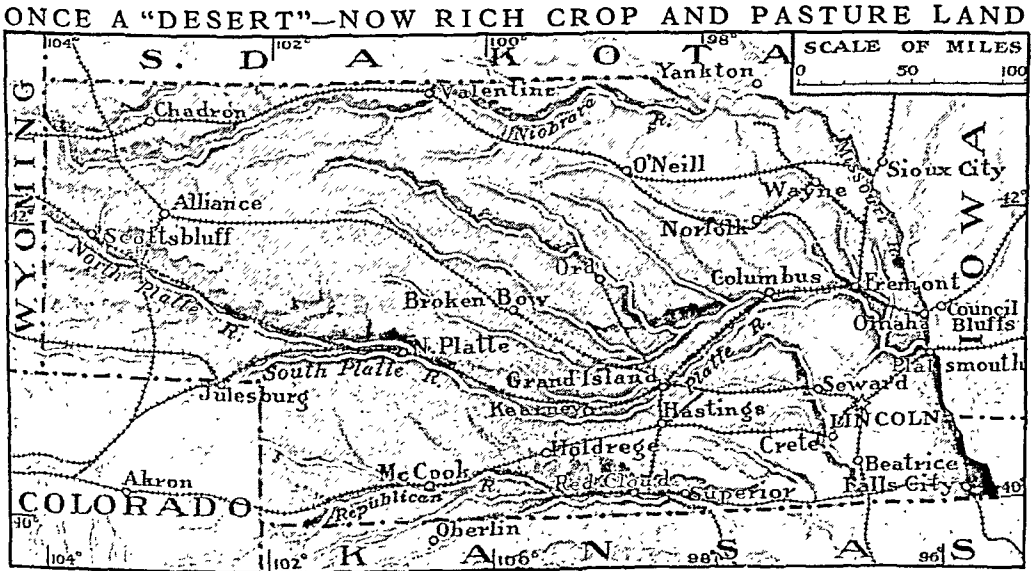
This prosperous modern ranch in Keya Paha County is typical of those situated in north-central Nebraska. Note the well-kept home and farm buildings and the family garden. The cattle graze on the grass-covered rolling hills and find shade under the scattered clumps of trees on hot sunny days.

Stretching irregularly across the center of the state is a vast sweep of sandhills. These are grass-covered and smooth with few trees or rocks. Once they were windswept shifting dunes which resulted from unwise farming and prairie fires. Toward the east the hills become rolling prairies which cover three-fourths of the area of the state.

A "Desert" Became Farm Land

Early explorers called the Nebraska region the "Great Desert." In its far western part, rainfall is too light to support crops. Yet this section has fine and extensive grazing land. In the central part rainfall is somewhat heavier. When the plow broke the plains and ruined the natural grass cover, rain water drained off rapidly, carrying the rich topsoil with it. Since then farmers have learned water and soil conservation methods and they tap the ground water which underlies nearly all the state. Scientific farming and irrigation are said to have raised the level of the underground water table in many places in the eastern part

ONCE A "DESERT"—NOW RICH CROP AND PASTURE LAND



Before early residents knew how to farm such land they thought that most of Nebraska was a barren waste. Now, however, nearly every part of the state yields farm products. The vast ranges of the upper northwest section have fine grazing lands for cattle. Crop farming is concentrated in the eastern part. There corn is raised and much of it is used to fatten cattle and hogs for market.

of the state. Since nearly half the annual rainfall comes in the growing season, May, June, and July, it is sufficient for crop needs. In western Nebraska, especially in the North Platte and Republican valleys, irrigation is extensively practiced. In Keith County, Kingsley Dam holds back the North Platte River to form 23-mile-long Lake McConaughy. The reservoir of Harlan County Dam, across the Republican River in south central Nebraska, began to fill up in 1951. It is a key project for flood control and irrigation in the Missouri River development program (*see* Missouri River). In western Nebraska, dry-farming produces good yields from lands which cannot be irrigated.

Farm and Mineral Products

The state's rich topsoil and deep moisture-holding subsoil and the industry and scientific practices of its farmers have combined to make Nebraska one of the greatest agricultural states of the Union. Although Nebraska ranks 33d among the states in population, it is among the first dozen states in farming.

Nebraska is among the leading states in the production of corn, which is raised in the corn-belt section of eastern Nebraska. About two thirds of the huge crop is used to fatten the millions of hogs and cattle that account for one half of the state's total farm income. In the southwest are broad golden wheat fields which produce another valuable crop. Hay, oats, and barley are also grown extensively as feed crops.

Potatoes and sugar beets thrive in the irrigated land of the river valleys. Dry edible beans are a specialty crop in the valley of the North Platte in western Nebraska. The southeastern part of the state along the Missouri River grows apples, peaches, and other fruits. Milk, eggs, chickens, and sheep are also valuable farm products.

While Nebraska is called "the state without a mine," it produces cement, petroleum, sand, gravel, stone, clays, and natural gas. Oil was discovered in Richardson County in 1939 and in Cheyenne County in 1949. By 1950 the output of oil was substantial, and that of natural gas, promising.

Manufactured Goods

Compared to agriculture, Nebraska's manufacturing industry is relatively small. The state has more than three times as many gainfully employed people on farms as in factories. Its total farm income is many times greater than the total value added to goods by factories and mills.

The state's manufacturing industries, however, contribute much to Nebraska's prosperity. Being a food-raising state, its major manufactures are based upon the processing of farm products. These include meat packing, the milling of flour and meal, and poultry dressing. Such food products account for almost half of the state's manufacturing. Other industries are printing and publishing and chemicals.

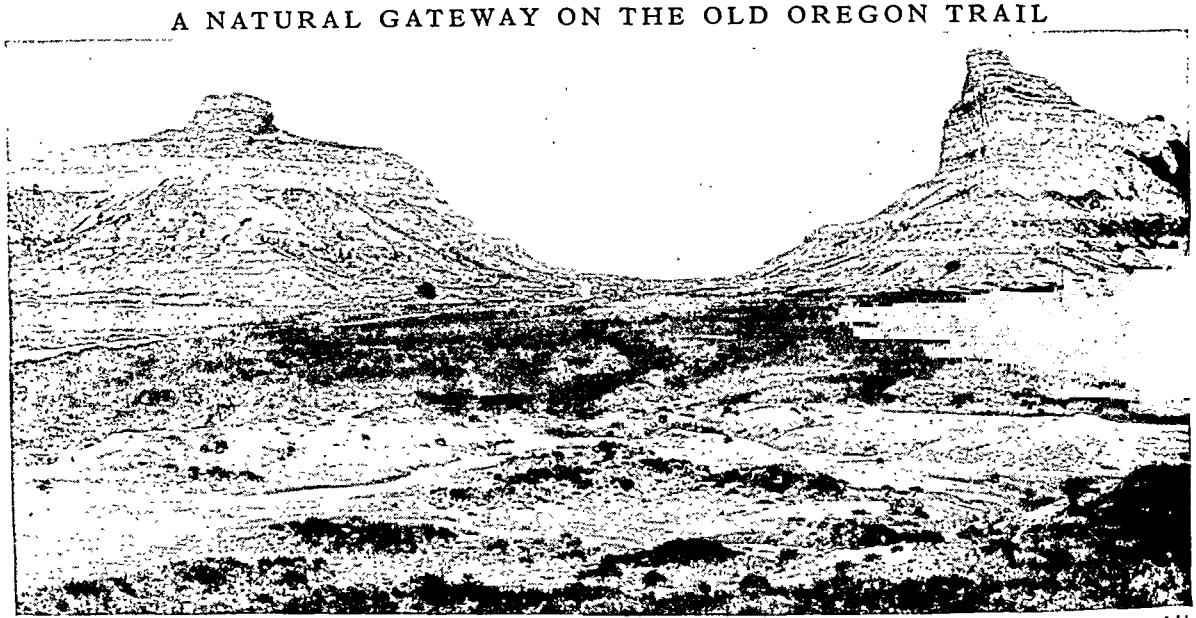
Features and Names

The climate of Nebraska is exceptionally healthful. The temperature averages range from about 73°F. in summer to about 26° in winter, but heat and cold are not felt severely because of the dry atmosphere. Nebraska lacks the splendor which mountains, lakes, and forests lend other states. Yet it has real beauty in the "scenery of the sky," when a sunset is viewed across the rolling prairies.

The name Nebraska probably came from an Indian word meaning "shallow or spreading water." It is officially known as the "Cornhusker State" and often called the "Tree Planters State." The first settlers found prairies with no trees except along streams.

Continued on page 103

A NATURAL GATEWAY ON THE OLD OREGON TRAIL



Through historic Mitchell Pass in western Nebraska rolled the prairie schooners which carried the pioneers out to the winning of the West. This famous highway was known as the Oregon Trail. The Pass is now part of the Scotts Bluff National Monument, named for the landmark towering about 800 feet at the right. South Bluff rises at the left. These bluffs are "islands of erosion"—standing alone as the surrounding plains were gradually worn down by wind, rain, and waters of the North Platte River.

Nebraska Fact Summary

NEBRASKA (Neb.): Probably from *Nebrathka*, Otoe Indian word meaning "shallow or spreading water."

Nickname: "Cornhusker State," from name given to University of Nebraska's football team. Also, "Tree Planters State," from settlers' tree-planting efforts and first Arbor Day.

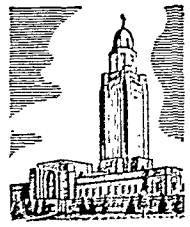
Seal: Man works at anvil; settler's cabin and sheaves of wheat; steamboat on Missouri River; train and Rocky Mountains in the background.

Motto: Equality before the Law.

Flag: For description and illustration, *see* Flags.

Flower: Goldenrod. **Bird:** Western meadowlark. **Tree:** American elm. **Song** (unofficial): 'My Nebraska'—words and music by Theodore C. Diers; also 3 other songs.

THE GOVERNMENT



Capital: Lincoln (since 1867).

Representation in Congress: Senate, 2; House of Representatives, 4. Electoral votes, 6.

State Legislature: Senate of 43 members; nonpartisan election; term, 2 years. Convenes first Tuesday in January in odd years. There is no constitutional limit to regular or special sessions.

Constitution: Adopted 1875. Proposed amendment may be (a) passed by a three-fifths vote of legislature or by initiative action of the people and (b) ratified by a majority voting on amendment at a popular election.

Governor: Term, 2 years. May succeed himself.

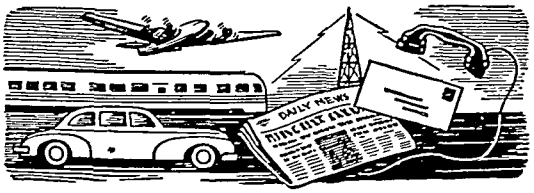
Other Executive Officers: Lieutenant governor, secretary of state, attorney general, treasurer, and auditor, all elected; terms, 2 years. Heads of administrative depts. chosen by governor with consent of legislature.

Judiciary: Supreme court—chief justice, elected at large; 6 justices elected by districts; term, 6 years. District courts—18; 35 judges, elected; term, 4 years. County courts—1 in each county; judge elected; term, 4 years.

County: 93 counties, governed by boards, each composed either of 7 supervisors or of 3 or 5 commissioners. Board and officers elected; terms, 4 years.

Municipal: Mayor-council plan most common; some cities have commissioners or a city manager.

Voting Qualifications: Age, 21; residence in state, 6 months; in county, 40 days; in district, 10 days.



TRANSPORTATION AND COMMUNICATION

Transportation: Railroads, 5,800 miles. First railroad, Union Pacific (from Omaha to Kearney), 1866. Rural roads, 100,000 miles. Airports, 134.

Communication: Periodicals, 57. Newspapers, 312. First newspaper, *Nebraska Palladium and Platte Valley Advocate*, Bellevue, 1854–55. Radio stations (AM and FM), 24; first station, WOU (now KOWH), Omaha, licensed Dec. 29, 1921. Television stations, 4; first station, WOW-TV, Omaha, began operation Aug. 29, 1949. Telephones, 442,400. Post offices, 660.

THE PEOPLE AND THEIR LAND

Population (1950 census): 1,325,510 (rank among 48 states—33d); urban, 46.9%; rural, 53.1%. Density 17.3 persons per square mile (rank—37th state).

Extent: Area, 77,227 square miles, including 564 square miles of water surface (14th state in size).

Elevation: Highest, southwest part of Banner County, 5,340 feet; lowest, southeast corner of state, 840 feet.

Temperature (°F.): Average—annual, 50°; winter, 26°; spring, 48°; summer, 73°; fall, 51°. Lowest recorded, —47° (Camp Clarke, Cheyenne County, Feb. 12, 1899); highest recorded, 118° (Minden, July 24, 1936, and other locations and earlier dates).

Precipitation: Average (inches)—annual, 23; winter, 2; spring, 7; summer, 10; fall, 4. Varies from about 16 in west to about 34 in southeast.

Natural Features: Rich, black earth along eastern border (Missouri River lowland); rolling hills and valleys westward (Loess Hills); ridges and dunes of windblown sand north central and west central (Sand Hills). Principal rivers: Elkhorn, Loup, Missouri, Niobrara, Platte, Republican.

Land Use: Cropland, 46%; nonforested pasture, 48%; forest, 2%; other (roads, parks, game refuges, wasteland, cities, etc.), 4%.



Natural Resources: *Agricultural*—rich soil adaptable to special farming methods. *Industrial*—minerals include cement, petroleum, sand and gravel, stone, clays, and natural gas. *Commercial*—profitable trade from industries based on processed farm products such as meat, flour, and beet sugar.

OCCUPATIONS AND PRODUCTS

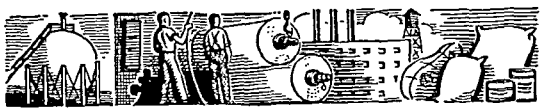
What the People Do to Earn a Living



Major Industries and Occupations, 1950

Fields of Employment	Number Employed	Percentage of Total Employed
Agriculture, forestry, and fishery	151,648	29.6
Wholesale and retail trade	97,365	19.0
Manufacturing	46,915	9.2
Transportation, communication, and other public utilities	46,810	9.1
Professional services (medical, legal, educational, etc.)	43,514	8.5
Construction	32,838	6.4
Personal services (hotel, domestic, laundering, etc.)	23,461	4.6
Government	20,276	4.0
Finance, insurance, and real estate	17,388	3.4
Business and repair services	14,128	2.8
Amusement, recreation, and related services	4,494	0.9
Mining	1,073	0.2
Workers not accounted for	11,739	2.3
Total employed	511,649	100.0

Nebraska Fact Summary



What the People Produce

A. Manufactured Goods (Rank among states—38th)
Value added by manufacture* (1952), $337,577,000

Leading Industries in 1947 (with Principal Products)	Value Added by Manufacture	Rank among States
FOOD AND KINDRED PRODUCTS.... Meat packing; flour and meal; prepared animal feeds; poultry dressing; beverages	$156,216,000	17
PRINTING AND PUBLISHING..... Newspapers; commercial printing	21,505,000	29
CHEMICALS AND ALLIED PRODUCTS Drugs and medicines; vegetable and animal oils	10,926,000	35
ELECTRICAL MACHINERY.....	10,698,000	20
MACHINERY (EXCEPT ELECTRICAL) Tractors and farm machinery	10,462,000	33
FABRICATED METAL PRODUCTS....	7,498,000	33

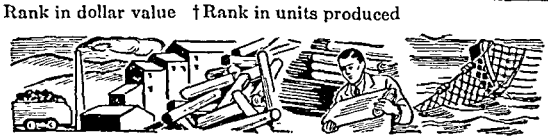
*For explanation of value added by manufacture, *see* Census.



B. Farm Products (Rank among states—7th)
Total cash income (1952), $1,163,167,000

Products	Amount Produced (10-Year Average)	Rank within State*	Rank among States†
Corn.....	210,496,000 bu.	1	5
Cattle.....	1,012,429,000 lbs.	2	4
Hogs.....	911,575,000 lbs.	3	7
Wheat.....	63,652,000 bu.	4	5
Milk.....	1,194,000,000 qts.	5	14
Hay.....	4,080,000 tons	6	7
Eggs.....	143,000,000 doz.	7	13
Oats.....	58,716,000 bu.	8	7
Chickens.....	111,476,000 lbs.	9	15
Sheep and lambs	48,952,000 lbs.	10	17
Barley.....	19,514,000 bu.	11	5
Potatoes.....	10,542,000 bu.	12	13

*Rank in dollar value †Rank in units produced



C. Minerals (Fuels, Metals, and Stone)
Annual value (1951), $18,469,000
Rank among states—40th

Minerals (1951)	Amount Produced	Value
Cement*.....	.....	.....
Petroleum.....	2,558,000 bbls.	$5,960,000
Sand and gravel..	4,969,000 tons	3,477,000
Stone.....	943,000 tons	1,438,000

*Cement ranks 1st in value; exact figures not available.

D. Trade

Trade (1948)	Sales	Rank among States
Wholesale.....	$2,365,053,000	19
Retail.....	1,317,813,000	29
Service.....	98,973,000	30



EDUCATION

Public Schools: Elementary, 4,798; secondary, 513. Compulsory school age, 7 through 15. State Board of Education consists of 6 elected members; appoints Commissioner of Education. County superintendents elected for 4-year terms. State divided into 6 types of school districts administered by local boards elected by popular vote. City superintendents elected by city boards of education.

Private and Parochial Schools: 250.

Colleges and Universities (accredited): Colleges, 17; junior colleges, 5. State-supported schools include the Univ. of Nebraska, Lincoln; 4 teachers colleges—Peru, Kearney, Wayne, Chadron; State Trade School, Milford.

Special State Institutions: Nebraska School for the Blind, Nebraska City; Nebraska School for the Deaf, Omaha; Nebraska Orthopedic Hospital, Lincoln; Home for Children, Lincoln.

Libraries: City and town public libraries, 229; independent county library systems, 6. Public Library Commission responsible for aid in developing library service.

Outstanding Museums: House of Yesterday, Hastings; Neb. State Historical Society Museum, Univ. of Neb. Art Galleries, and Univ. of Neb. State Museum, all at Lincoln; Joslyn Memorial Art Museum, Omaha.

CORRECTIONAL AND PENAL INSTITUTIONS

Boys' Training School, Kearney; Girls' Training School, Geneva; State Reformatory for Women, York; State Reformatory, Lincoln; State Penitentiary, Lincoln.

STATE PARKS*

Arbor Lodge—home of J. Sterling Morton, founder of Arbor Day; pioneer vehicles; at Nebraska City (23).

Chadron—Mushroom Butte with interesting rock formation; Thunder Canyon; near Chadron (2).

Fort Kearney—frontier army post important in the westward movement; remains of rifle pits, powder magazine, and other earthworks; near Kearney (26).

Niobrara Island—wooded island with lagoon; includes game reserve, outdoor amphitheater; nr. Niobrara (4).

Ponca—on high bluffs overlooking Missouri River; 3 states can be seen from high lookout; near Ponca (6).

Stolley—grove of trees first planted in the 1860's by William Stolley; frame schoolhouse, first in the county; site of Fort Independence; near Grand Island (21).

Victoria Springs—mineral springs which vary in chemical content due to composition of sandstone; log cabin house and post office built 1873; near Merna (14).

NATIONAL FOREST*

Nebraska—207,209 acres; hdqrs., Halsey; only man-made national forest in U. S.; systematic tree planting began in 1902 through efforts of Dr. Charles E. Bessey; became a national forest in 1908 (7, 13).

PLACES OF INTEREST*

Agate Fossil Beds—near Harrison; fossils of animals in a layer of rock 60 feet below surface of ground (8).

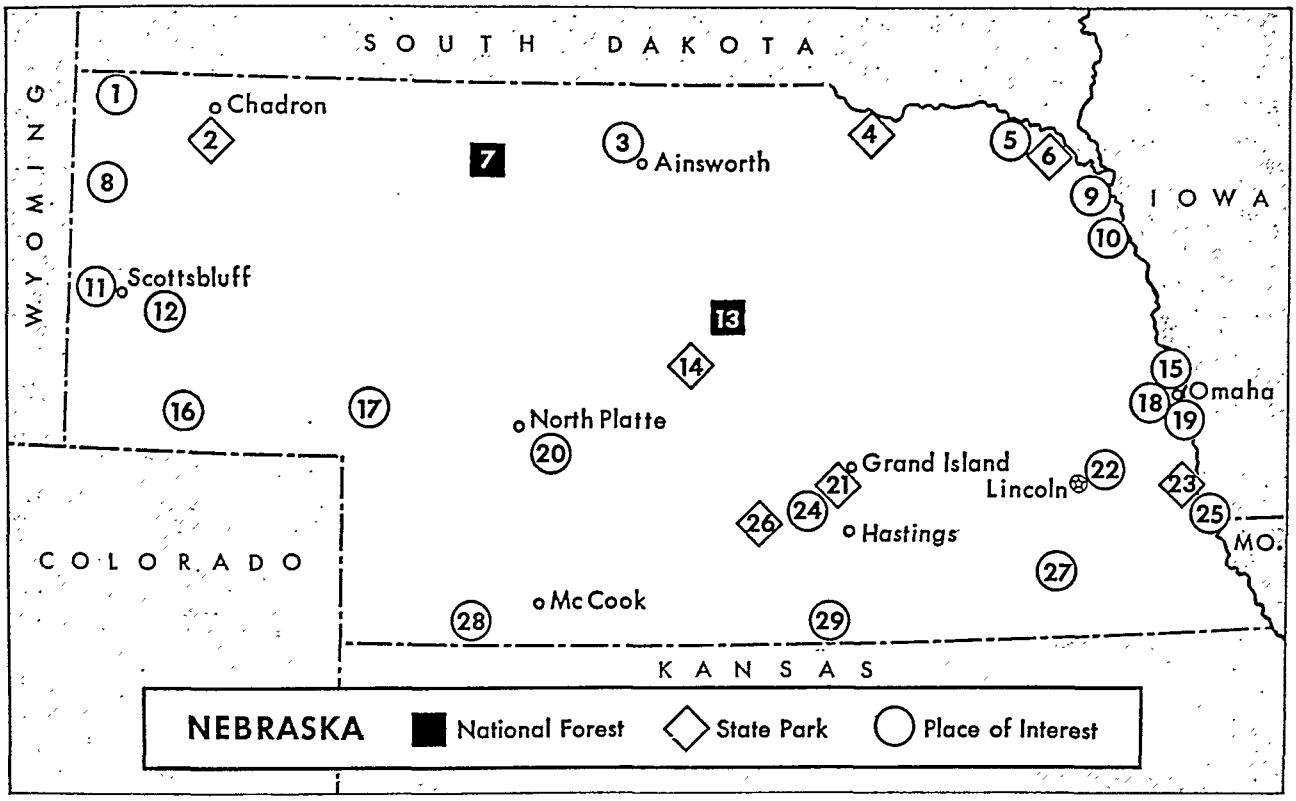
Bellevue—oldest Nebraska town, once the largest; site of early fur trade and first mission (19).

Chimney Rock—narrow shaft of reddish sandstone rising about 150 feet above the plateau (12).

Fort McPherson National Cemetery—near Maxwell; site of old army post on Oregon Trail (20).

*Numbers in parentheses are keyed to map.

Nebraska Fact Summary



Fossil Park—near Ainsworth; fossilized bones of mammoths and prehistoric horses found here (3).

Harlan County Dam—a key Missouri River basin project on Republican R. near Alma; west of (29).

Hastings Municipal Museum ("The House of Yesterday")—in Hastings; collections of natural, Indian, pioneer, and other historical relics; southeast of (26).

Homestead National Monument of America—nr. Beatrice; first farm claimed under 1862 Homestead Act (27).

Ionia Volcano—smoking bluff; held sacred by early Indian fire worshipers (5).

John Brown's Cave—Nebraska City; used by John Brown to hide runaway slaves (25).

Kingsley Dam—near Ogallala; great earth-filled dam creates largest body of water in Nebraska, Lake McConaughy, for irrigation and power (17).

Lincoln—State Capitol with 400-foot tower; University of Nebraska; Pioneer Park (*see* Lincoln) (22).

Massacre Canyon Monument—commemorates last battle between Pawnees and Sioux (1873); near Trenton (28).

Omaha—Joslyn Memorial includes concert hall, library, art exhibits (*see* Omaha) (15); Boys Town, Father Flanagan's community for homeless boys, nearby (18).

Omaha Indian Reservation—near Macy (10).

Pioneer Village—at Minden; thousands of historical relics of Nebraska and early West; southwest of (24).

Point of Rocks—view of countryside near Sidney can be seen from the heights (16).

Scotts Bluff National Monument—great bluff, about 800 feet high, was landmark on Oregon Trail during mass migration 1843-69; Oregon Trail Museum (11).

Toadstool Park—huge stone mushrooms in a field near Cottonwood Creek (1).

Willa Cather's Childhood Home—in Red Cloud (29).

Winnebago Indian Reservation—near Winnebago (9).

Ziebarth's Farm Museum—Indian relics in a museum near Kenesaw (24).

*Numbers in parentheses are keyed to map.

LARGEST CITIES (1950 census)

Omaha (251,117): on west bank of Missouri River; railroad center; large livestock market and meat-packing industry; lead refining; insurance center.

Lincoln (98,884): state capital; University of Nebraska; railroad shops; makes watches, telephone equipment.

Grand Island (22,682): railroad shops; flour, beet sugar; dairy, livestock market; army ordnance installation.

Hastings (20,211): hub of fertile agricultural area; farm implements; naval ammunition depot nearby.

North Platte (15,433): railroad terminal; food products.

Fremont (14,762): processing center for farm products.

Scottsbluff (12,858): business center of N. Platte Valley.

THE PEOPLE BUILD THEIR STATE



1598—Juan de Oñate claims New Mexico for Spain; area includes western portion of present Nebraska.

1682—René Robert Cavalier, Sieur de La Salle, claims all Mississippi Valley for France; names it "Louisiana."

1720—Pedro de Villasur leads Spanish expedition from Santa Fe to Platte River; Pawnee Indians kill him, drive his party back.

1739—Paul and Pierre Mallet explore route from Platte River to Santa Fe.

1762—France cedes land west of Mississippi River to Spain; Spain secretly returns it to France, 1800.

1803—United States buys "Louisiana" from France.

1804—Meriwether Lewis and William Clark, on trip to Pacific coast, enter Nebraska near Big Nemaha River; reach mouth of Platte River, July 21; retrace their route through region, 1806.

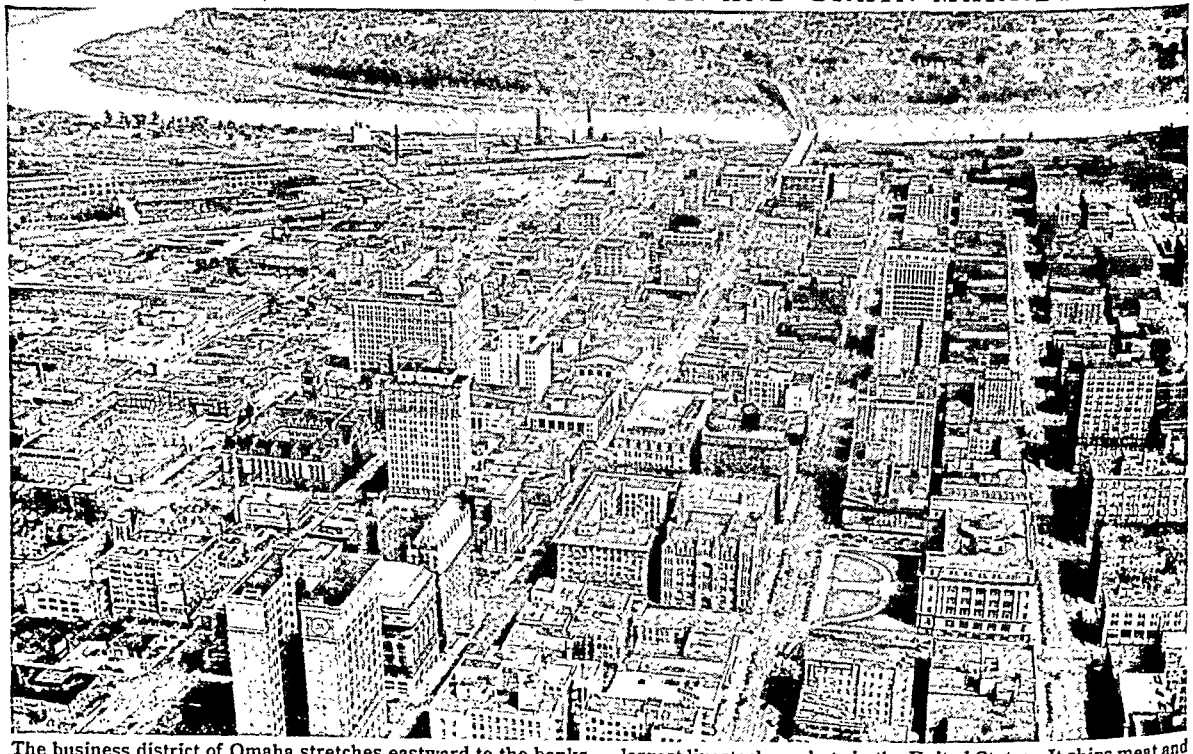
1807—Manuel Lisa establishes trading post near mouth of Bighorn River, possibly on site of Bellevue.

1812—Robert Stuart and party break new trail along Platte R.; later becomes part of Oregon Trail.

Nebraska Fact Summary

1819—First steamboat on upper Missouri River, *Western Engineer*, reaches present Omaha. "Yellowstone Expedition" under Maj. Stephen H. Long explores South Platte Valley to river's source.
1820—Congress, in passing Missouri Compromise, prohibits slave owning in Nebraska.
1832—Capt. B. L. E. Bonneville leads first wagon train along Platte Valley-South Pass route to West.
1833—Moses Merrill, missionary, arrives at Bellevue.
1838—Father Pierre de Smet begins Roman Catholic missionary work among Nebraska Indians.
1842—John C. Frémont explores Platte River region.
1846—Mormons trace Mormon Trail across Nebraska.
1854—Kansas-Nebraska Act creates Nebraska Territory from 40th to 49th parallels and from Missouri R. to Continental Divide; Omaha founded and made capital; first governor, Francis Burt.
1855—First territorial legislature meets at Omaha, January 16; provides for free common schools.
1860—Telegraph links Brownville and St. Joseph, Mo.
1861—Colorado and Dakota territories created, reducing Nebraska in size. Arapaho and Cheyenne Indians cede their Nebraska lands.
1863—Creation of Idaho Territory reduces Nebraska to its present borders. First homestead in Nebraska under National Homestead Act of 1862 secured by Daniel Freeman in Gage County, January 1.
1865—Union Pacific Railway begins building line west from Omaha; completed through Nebraska, 1867; forges link with transcontinental line at Promontory, Utah, May 10, 1869.
1867—Nebraska admitted to Union as 37th state, March 1; Lancaster, renamed Lincoln, made state capital, July 29; first governor, David Butler.
1869—Univ. of Nebraska founded at Lincoln; opens, 1871.
1870—Legislature restricts use of open range for cattle; first cattle loaded for shipping to East at Schuyler.
1872—First Arbor Day, proposed by J. Sterling Morton, celebrated in Nebraska; becomes national custom.
1873—First permanent railroad bridge across Missouri River completed at Omaha.
1875—Present state constitution adopted. Federal government begins removal of Indians to Oklahoma.
1877—Hostile Sioux surrender at Fort Robinson, May 6; agree to leave state; Chief Crazy Horse killed.
1890—Sugar-beet refining begun at Grand Island.
1896—William Jennings Bryan, Nebraska congressman, is unsuccessful candidate of Democrats and Populists for president of U. S.; also defeated, 1900 and 1908.
1902—George W. Norris, famous liberal, elected congressman from Nebraska; elected senator, 1912–42.
1904—Kincaid Homestead Act furthers settlement of open range in northern and western Nebraska.
1912—State-wide prohibition adopted.
1929—Drought creates dust bowl in state; ends 1936.
1932—Skyscraper State Capitol at Lincoln dedicated.
1936—Father Flanagan's Boys Town incorporated 10 miles west of Omaha.
1937—One-house state legislature holds first session.
1939—Oil discovered in southeast near Falls City; also found in southwest in Cheyenne County in 1949.
1951—Reservoir of Harlan County Dam, built on the Republican River for flood control, begins filling.
1952—Constitutional amendment abolishes elective Supt. of Public Education; provides Board of Education to appoint a Commissioner of Education.
1953—Serious drought in some areas.

OMAHA, NEBRASKA'S LIVESTOCK AND GRAIN MARKET



The business district of Omaha stretches eastward to the banks of the Missouri River, once the chief transportation way for the city. Now served by railroads, Omaha has become one of the largest livestock markets in the United States. It ships meat and meat products all over the nation. The incoming wheat and corn, stored in elevators, are used by the city's mills and breweries.

NEBRASKA

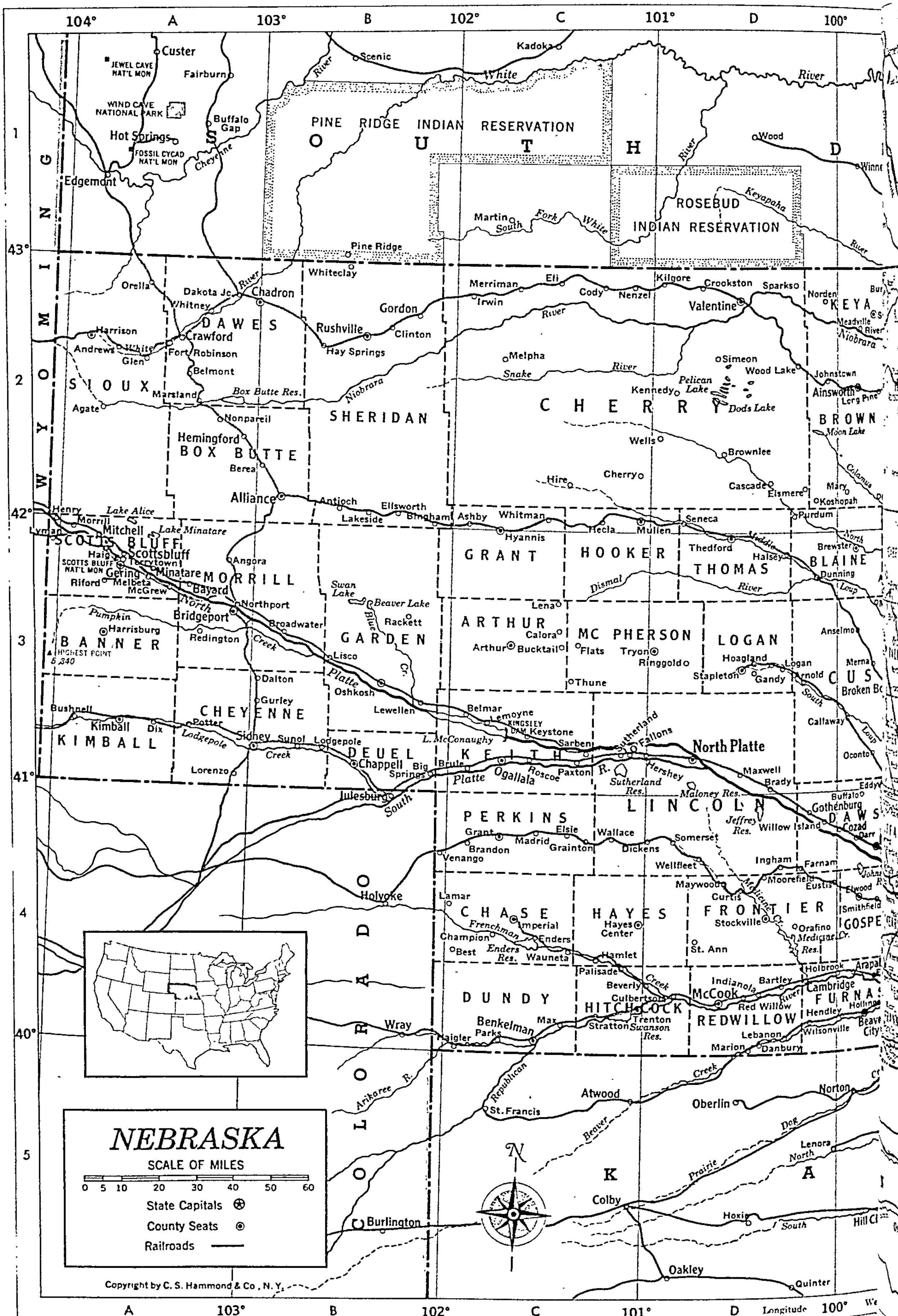
COUNTIES

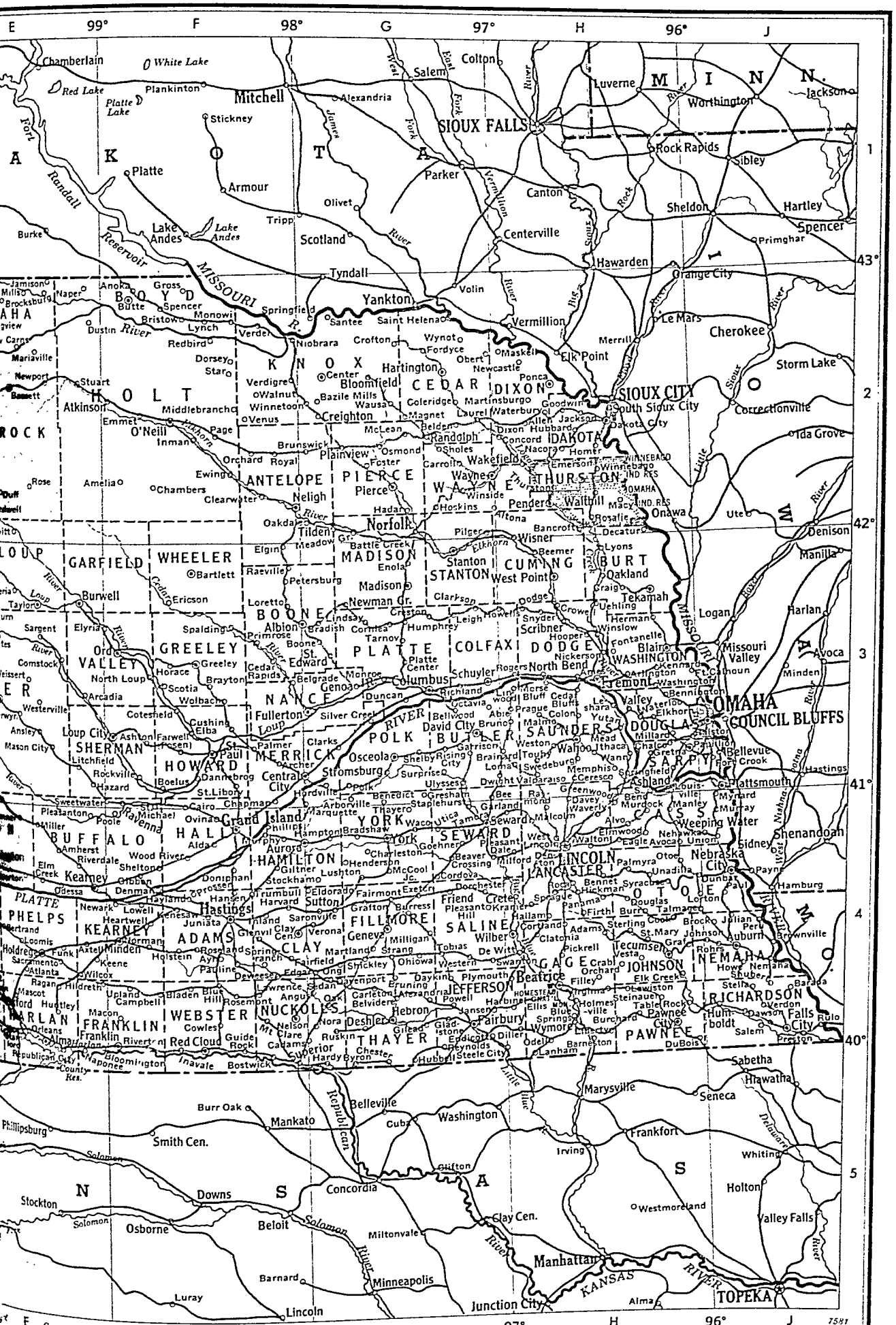
Adams	28,855	F 4
Antelope	11,624	F 2
Arthur	803	C 3
Banner	1,325	A 3
Blaine	1,203	E 3
Boone	10,721	F 3
Box Butte	12,279	A 2
Boyd	4,911	F 2
Brown	5,164	E 2
Buffalo	25,134	E 4
Burt	11,536	H 3
Butler	11,432	G 3
Cass	16,361	H 4
Cedar	13,843	G 2
Chase	5,176	C 4
Cherry	8,397	C 2
Cheyenne	12,081	A 3
Clay	8,700	F 4
Colfax	10,010	G 3
Cuming	12,994	H 3
Custer	19,170	E 3
Dakota	10,401	H 2
Dawes	9,708	A 2
Dawson	19,393	E 4
Deuel	3,330	B 3
Dixon	9,129	H 2
Dodge	26,265	H 3
Douglas	281,020	H 3
Dundy	4,354	C 4
Fillmore	9,610	G 4
Franklin	7,096	F 4
Frontier	5,282	D 4
Furnas	9,385	E 4
Gage	28,052	H 4
Garden	4,114	B 3
Garfield	2,912	F 3
Gosper	2,734	E 4
Grant	1,057	C 3
Greeley	5,575	F 3
Hall	32,186	F 4
Hamilton	8,778	F 4
Harlan	7,189	E 4
Hayes	2,404	C 4
Hitchcock	5,867	C 4
Holt	14,859	F 2
Hooker	1,061	C 3
Howard	7,226	F 3
Jefferson	13,623	G 4
Johnson	7,251	H 4
Kearney	6,409	F 4
Keith	7,449	C 3
Keya Paha	2,160	E 2
Kimball	4,283	A 3
Knox	14,820	G 2
Lancaster	119,742	H 4
Lincoln	27,380	D 4
Logan	1,357	D 3
Loup	1,348	E 3
Madison	24,338	G 3
McPherson	825	C 3
Merrick	8,812	F 3
Morrill	8,263	A 3
Nance	6,512	F 3
Nemaha	10,973	J 4
Nuckolls	9,609	F 4
Otoe	17,056	H 4
Pawnee	6,744	H 4
Perkins	4,809	C 4
Phelps	9,048	E 4
Pierce	9,405	G 2
Platte	19,910	G 3
Polk	8,044	G 3
Red Willow	12,977	D 4
Richardson	16,886	J 4
Rock	3,026	E 2
Saline	14,046	G 4
Sarpy	15,693	H 3
Saunders	16,923	H 3
Scotts Bluff	33,939	A 3
Seward	13,155	G 4
Sheridan	9,539	B 2
Sherman	6,421	F 3
Sioux	3,124	A 2
Stanton	6,387	G 3
Thayer	10,563	G 4
Thomas	1,206	D 3
Thurston	8,590	H 2
Valley	7,252	E 3
Washington	11,511	H 3
Wayne	10,129	G 2
Webster	7,395	F 4
Wheeler	1,526	F 3
York	14,346	G 4

CITIES AND TOWNS

Abie	113	H 3
Adams	457	H 4
Agate	10	A 2
Ainsworth	2,150	D 2
Albion	2,132	F 3
Alda	190	F 4
Alexandria	317	G 4
Allen	374	H 2
Alliance	7,891	A 2
Alma	1,768	E 4
Almeria	20	E 3
Altona	20	H 2
Alvo	190	H 4
Amelia	67	F 2
Ames	80	H 3
Amherst	219	E 4
Andrews	14	A 2
Angora	36	A 3
Angus	34	F 4
Anoka	60	F 2
Anselmo	316	E 3
Ansley	711	E 3
Antioch	30	B 2
Arapahoe	1,226	E 4
Arborville	65	G 3
Arcadia	574	F 3
Archer	103	F 3
Arlington	593	H 3
Arnold	936	D 3
Arthur	176	C 3
Ashby	150	C 2
Ashland	1,713	H 3
Ashton	381	F 3
Atkinson	1,372	E 2
Atlanta	147	E 4
Auburn	3,422	J 4
Aurora	2,455	F 4
Avoca	196	H 4
Axtell	352	E 4
Ayr	121	F 4
Bancroft	596	H 2
Barada	83	J 4
Barneston	208	H 4
Bartlett	145	F 3
Bartley	399	D 4
Bassett	1,066	E 2
Battle Creek	630	G 3
Bayard	1,869	A 3
Bazile Mills	46	G 2
Beardwell	6	E 2
Beatrice	11,813	H 4
Beaver City	913	E 4
Beaver Crossing	425	G 4
Bee	160	H 3
Beemer	613	H 3
Belden	192	G 2
Belgrade	284	G 3
Bellevue	3,858	J 3
Bellwood	389	G 3
Belmar		C 3
Belmont	25	A 2
Belvidere	274	G 4
Benedict	206	G 3
Benkelman	1,512	C 4
Bennet	396	H 4
Bennington	315	H 3
Berea	27	A 2
Bertrand	584	E 4
Berwyn	138	E 3
Best	12	C 4
Beverly	18	C 4
Big Springs	527	B 3
Bingham	100	B 2
Bladen	282	F 4
Blair	3,815	H 3
Bloomfield	1,455	G 2
Bloomington	293	F 4
Blue Hill	574	F 4
Blue Springs	581	H 4
Boelus	167	F 3
Boone	100	F 3
Bostwick	54	F 4
Boys Town	975	*H 3
Bradish	5	G 3
Bradshaw	352	G 4
Brady	320	D 3
Brainard	373	G 3
Brandon	40	C 4
Brayton	1	F 3
Brewster	69	D 3
Bridgeport	1,631	A 3
Bristow	146	F 2
Broadwater	300	B 3
Brock	283	H 4
Brocksburg	15	E 2
Broken Bow	3,396	E 3
Brownlee	38	D 2
Brownville	357	J 4
Brule	330	C 3
Bruning	246	G 4
Bruno	155	G 3
Brunswick	260	G 2
Bucktail	23	C 3
Buffalo	12	E 4
Burchard	201	H 4
Burr	91	H 4
Burress	6	G 4
Burton	45	E 2
Burwell	1,413	E 3
Bushnell	225	A 3
Butte	614	F 2
Byron	159	G 4
Cadams	19	F 4
Cairo	422	F 3
Callaway	744	D 3
Calora	8	C 3
Cambridge	1,352	D 4
Campbell	412	F 4
Carleton	291	G 4
Carns	5	E 2
Carroll	309	G 2
Cascade	9	D 2
Cedar Bluffs	505	H 3
Cedar Rapids	541	F 3
Center	148	G 2
Central City	2,394	F 3
Ceresco	374	H 3
Chadron	4,687	B 2
Chalco	32	H 3
Chambers	395	F 2
Champion	170	C 4
Chapman	274	F 3
Chappell	1,297	B 3
Charleston	50	G 4
Cherry	2	C 2
Chester	539	G 4
Clarks	464	G 3
Clarkson	764	G 3
Clatonia	192	H 4
Clay Center	824	F 4
Clearwater	472	F 2
Clinton	36	B 2
Cody	296	C 2
Coleridge	621	G 2
Colon	127	H 3
Columbus	8,884	G 3
Comstock	302	E 3
Concord	194	H 2
Cook	332	H 4
Cordova	147	G 4
Cornlea	69	G 3
Cortland	288	H 4
Cotesfield	106	F 3
Cowles	130	F 4
Cozad	2,910	E 4
Crab Orchard	120	H 4
Craig	384	H 3
Crawford	1,824	A 2
Creighton	1,401	G 2
Creston	228	G 3
Crete	3,692	G 4
Crofton	630	G 2
Crookston	168	D 2
Crowell	31	H 3
Culbertson	770	C 4
Curtis	964	D 4
Cushing	71	F 3
Dakota City	622	H 2
Dakota Jct.	6	A 2
Dalton	417	B 3
Danbury	218	D 4
Dannebrog	318	F 3
Darr	39	E 4
Davenport	459	G 4
Davey	112	H 4
David City	2,321	G 3
Dawson	309	J 4
Daykin	157	G 4
De Witt	528	G 4
Decatur	808	H 2
Denman	23	F 4
Denton	101	H 4
Deshler	1,063	G 4
Deweese	115	F 4
Dickens	60	C 4
Diller	314	H 4
Dix	270	A 3
Dixon	159	H 2
Dodge	633	H 3
Doniphan	412	F 4
Dorchester	478	G 4
Dorsey	2	F 2
Douglas	213	H 4
Du Bois	236	H 4
Duff	2	E 2
Dunbar	228	J 4
Duncan	228	G 3
Dunning	254	E 3
Dustin	3	E 2
Dwight	218	G 3
Eagle	255	H 4
Eddyville	188	E 3
Edgar	724	F 4
Edison	302	E 4
Elba	216	F 3
Eldorado	40	G 4
Elgin	820	F 3
Eli	40	C 2
Elk Creek	176	H 4
Elkhorn	476	H 3
Ellis	69	H 4
Ellsworth	9	B 2
Elm Creek	799	E 4
Elmwood	445	H 4
Elsie	219	C 4
Elsmere	34	D 2
Elwood	562	E 4
Elyria	87	E 3
Emerson	784	H 2
Emmet	62	F 2
Enders	75	C 4
Endicott	195	G 4
Enola	23	G 3
Ericson	186	F 3
Eustis	413	D 4
Ewing	705	F 2
Exeter	747	G 4
Fairbury	6,395	G 4
Fairfield	503	G 4
Fairmont	729	G 4
Falls City	6,203	J 4
Farnam	323	D 4
Farwell	172	F 3
Filley	136	H 4
Firth	245	H 4
Flats	4	C 3
Fontanelle	103	H 3
Fordyce	165	G 2
Fort Calhoun	314	J 3
Fort Crook	400	J 3
Fort Robinson	36	A 2
Foster	114	G 2
Franklin	1,602	E 4
Fremont	14,762	H 3
Friend	1,148	G 4
Fullerton	1,520	F 3
Funk	123	E 4
Gandy	88	D 3
Garland	184	G 4
Garrison	88	G 3
Gates	14	E 3
Geneva	2,031	G 4
Genoa	1,026	G 3
Gering	3,842	A 3
Gibbon	1,063	F 4
Gilead	109	G 4
Giltner	284	F 4
Gladstone	63	G 4
Glen	19	A 2
Glenvil	281	F 4
Goehner	67	G 4
Goodwin	3	H 2
Gordon	2,058	B 2
Gothenburg	2,977	D 4
Graf	50	H 4
Grafton	159	G 4
Grainton	91	C 4
Grand Isl.	22,682	F 4
Grant	1,091	C 4
Greeley	787	F 3
Greenwood	364	H 3
Gresham	267	G 3
Gretna	438	H 3
Gross	29	F 2
Guide Rock	676	F 4
Gurley	219	B 3
Hadar	129	G 2
Haig	64	A 3
Haigler	398	C 4
Hallam	172	H 4
Halsey	165	D 3
Hamlet	154	C 4
Hampton	289	G 4
Hansen	50	F 4
Harbine	85	G 4
Hardy	348	G 4
Harrisburg	94	A 3
Harrison	492	A 2
Hartington	1,660	G 2
Harvard	774	F 4
Hastings	20,211	F 4
Hay Springs	1,091	B 2
Hayes Center	361	C 4
Hayland	11	F 4
Hazard	130	F 3
Heartwell	125	F 4
Hebron	2,000	G 4
Hecla	6	C 2
Hemingford	946	A 2
Henderson	536	G 4
Hendley	130	D 4
Henry	171	A 2
Herman	380	H 3
Hershey	573	D 3

*No room on map for name.

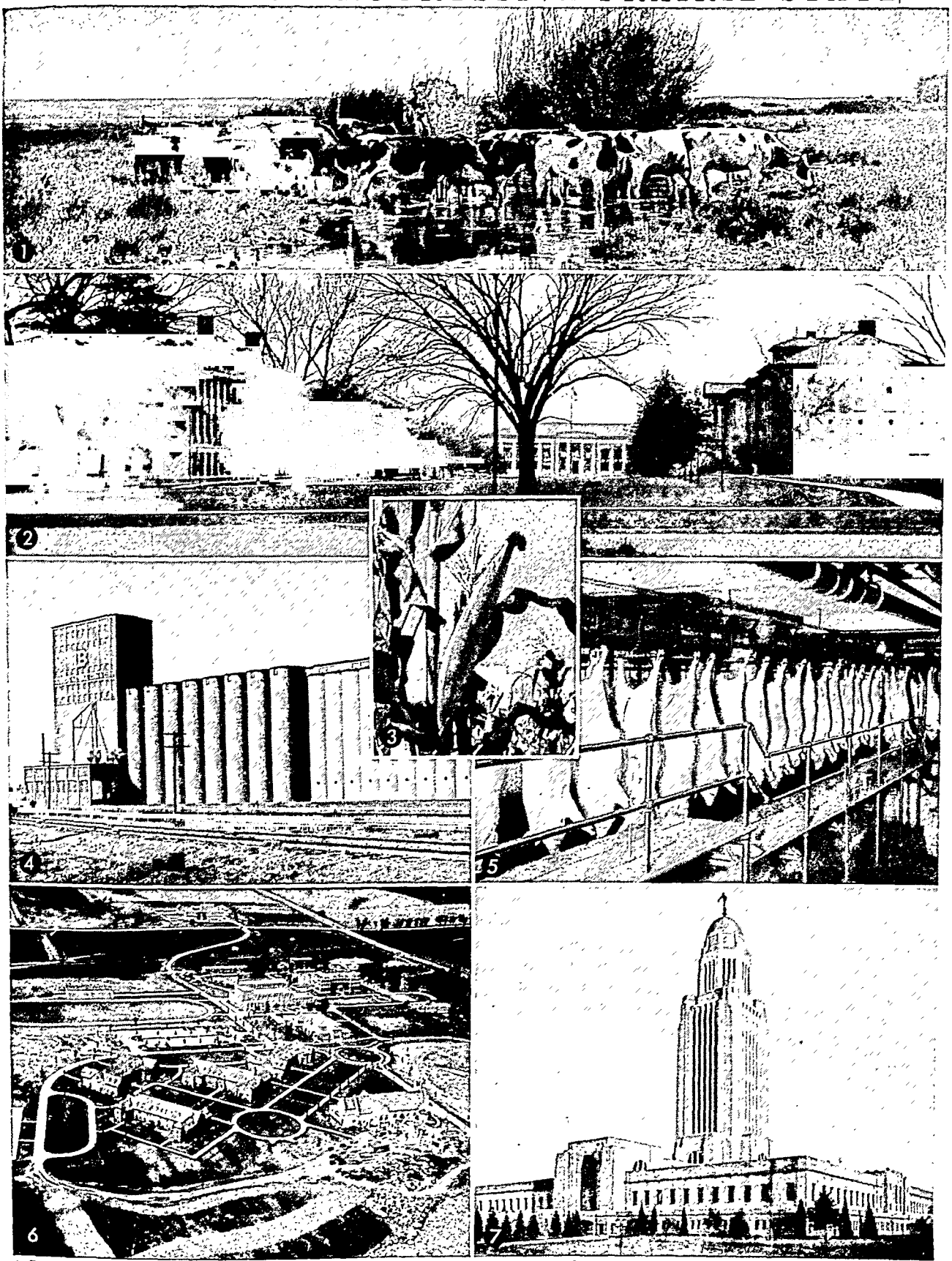

NEBRASKA
SCALE OF MILES
0 5 10 20 30 40 50 60
State Capitals
County Seats
Railroads
Copyright by C. S. Hammond & Co., N. Y.
104°
103°
102°
101°
100°
43°
42°
41°
40°
A
B
C
D
1
2
3
4
5
Longitude
S O U T H D A K O T A
W Y O M I N G
C O L O R A D O
K A N S A S
PINE RIDGE INDIAN RESERVATION
ROSEBUD INDIAN RESERVATION
JEWEL CAVE NAT'L MON
WIND CAVE NATIONAL PARK
FOSSIL CYCAD NAT'L MON
SCOTTS BLUFF NAT'L MON
HIGHEST POINT 5,340
Custer
Fairburn
Buffalo Gap
Hot Springs
Edgemont
Scenic
Kadoka
Wood
Winner
Martin
Pine Ridge
White River
Cheyenne
Keyapaha
South Fork White
SIOUX
DAWES
SHERIDAN
CHERRY
BOX BUTTE
KEYA
BROWN
SCOTTS BLUFF
MORRILL
GARDEN
GRANT
HOOKER
THOMAS
BLAINE
BANNER
ARTHUR
MC PHERSON
LOGAN
CUSTER
KIMBALL
CHEYENNE
DEUEL
KEITH
LINCOLN
PERKINS
DAWSON
CHASE
HAYES
FRONTIER
GOSPER
DUNDY
HITCHCOCK
REDWILLOW
FURNAS
Orella
Dakota Jc.
Whitney
Chadron
Whiteclay
Harrison
Andrews
Glen
Crawford
Fort Robinson
Belmont
Marsland
Agate
Rushville
Hay Springs
Gordon
Clinton
Merriman
Irwin
Eli
Cody
Nenzel
Kilgore
Crookston
Sparks
Valentine
Norden
Meadville
Niobrara River
Melpha
Snake River
Simeon
Wood Lake
Johnstown
Ainsworth
Long Pine
Pelican Lake
Kennedy
Dods Lake
Box Butte Res.
Nonpareil
Hemingford
Berea
Alliance
Antioch
Ellsworth
Lakeside
Bingham
Ashby
Whitman
Hyannis
Wells
Brownlee
Moon Lake
Hire
Cherry
Cascade
Elsmere
Mary
Koshopah
Calamus
Henry
Lake Alice
Morrill
Lyman
Mitchell
Lake Minatare
Haig
Scottsbluff
Terrytown
Gering
Minatare
Riford
Melbeta
McGrew
Bayard
Angora
Northport
Bridgeport
Broadwater
North Platte
Swan Lake
Beaver Lake
Rackett
Blue Cr.
Hecla
Mullen
Seneca
Thedford
Halsey
Brewster
Dunning
Middle Loup
North Loup
Dismal River
Lena
Calora
Arthur
Bucktail
Flats
Tryon
Ringgold
Hoagland
Stapleton
Gandy
Logan
Arnold
Anselmo
Merna
Broken Bow
Thune
Pumpkin
Harrisburg
Redington
Creek
Lisco
Oshkosh
Platte
Dalton
Gurley
Lewellen
Belmar
Lemoyne
KINGSLEY DAM
Keystone
Sarben
Sutherland
Fallons
North Platte
Maxwell
Brady
Callaway
Oconto
South Loup
Bushnell
Kimball
Dix
Potter
Sidney
Sunol
Lodgepole
Lodgepole Creek
Chappell
Big Springs
Brule
Ogallala
Roscoe
Paxton
L. McConaughy
Lorenzo
Julesburg
South Platte
Sutherland Res.
Hershey
Maloney Res.
Jeffrey Res.
Willow Island
Gothenburg
Cozad
Darr
Eddyville
Buffalo
Grant
Madrid
Elsie
Grainton
Brandon
Venango
Wallace
Dickens
Somerset
Wellfleet
Ingham
Farnam
Moorefield
Eustis
Elwood
Johnson
Maywood
Curtis
Smithfield
Holyoke
Lamar
Imperial
Frenchman
Champion
Enders
Best
Enders Res.
Wauneta
Hayes Center
Hamlet
Stockville
Orafino
Medicine Cr.
Res.
St. Ann
Palisade
Beverly
Culbertson
Indianola
Bartley
Holbrook
Arapahoe
Cambridge
Holbrook
McCook
Red Willow
Hendley
Beaver City
Wilsonville
Lebanon
Danbury
Marion
Trenton
Swanson Res.
Stratton
Max
Benkelman
Parks
Haigler
Wray
Arikaree R.
Republican
St. Francis
Atwood
Oberlin
Norton
Beaver
Creek
Dog
Prairie
North
Lenora
Colby
Hoxie
South
Hill City
Burlington
Oakley
Quinter
N


E
99°
F
98°
G
97°
H
96°
J
1
2
3
4
5
43°
42°
41°
40°
Chamberlain
White Lake
Red Lake
Platte Lake
Plankinton
Mitchell
Alexandria
Salem
Colton
Luverne
Worthington
Jackson
Stickney
SIOUX FALLS
Rock Rapids
Sibley
Platte
Armour
Parker
Canton
Sheldon
Hartley
Spencer
Olivet
Tripp
Lake Andes
Scotland
Centerville
Primghar
Burke
Tyndall
Hawarden
Orange City
Volin
Yankton
Springfield
Santee
Saint Helena
Vermillion
Le Mars
Cherokee
Anoka
Gross
Butte
Spencer
Monowi
Bristow
Lynch
Verdel
Niobrara
Crofton
Wynot
Fordyce
Obert
Maskell
Newcastle
Merrill
Elk Point
Storm Lake
Dustin
Redbird
Dorsey
Star
Center
Hartington
Ponca
Verdigre
Walnut
Winnetoon
Bazile Mills
Bloomfield
Coleridge
Martinsburg
Goodwin
SIOUX CITY
South Sioux City
Correctionville
Stuart
Atkinson
Middlebranch
Venus
Creighton
Magnet
Laurel
Waterbury
Dakota City
Emmet
O'Neill
Inman
Page
McLean
Belden
Randolph
Dixon
Hubbard
Allen
Jackson
Concord
Ida Grove
Brunswick
Plainview
Osmond
Sholes
Carroll
Wakefield
Nacora
Homer
Emerson
Winnebago
Orchard
Royal
Foster
Ewing
Amelia
Chambers
Clearwater
Neligh
Pierce
Winside
Wayne
Thurston
Hoskins
Pender
Walthill
Macy
Rosalie
Onawa
Ute
Oakdale
Hadar
Norfolk
Pilger
Wisner
Bancroft
Decatur
Denison
Tilden
Battle Creek
Elgin
Meadow
Raeville
Petersburg
Enola
Madison
Stanton
West Point
Beemer
Lyons
Oakland
Craig
Tekamah
Manilla
Burwell
Ericson
Bartlett
Loretto
Newman Gr.
Clarkson
Dodge
Uehling
Logan
Harlan
Sargent
Elyria
Spalding
Albion
Primrose
Boone
Cornlea
Leigh
Howell
Snyder
Crowe
Herman
Winslow
Scribner
Hooper
Fontanelle
Blair
Missouri Valley
Avoca
Ord
Horace
Greeley
Cedar Rapids
Belgrade
Genoa
Columbus
Schuyler
Rogers
North Bend
Nickerson
Kennard
Arlington
Fremont
Washington
Ft. Calhoun
Minden
Comstock
North Loup
Scotia
Arcadia
Wolbach
Duncan
Richland
Octavia
Prague
Colon
Bellwood
Abie
Bruno
Malmo
Yutan
Waterloo
Elkhorn
Bennington
OMAHA
Westerville
Cotesfield
Fullerton
Silver Creek
Cushing
Elba
Loup City
Ashton
Farwell
Ansley
Mason City
Litchfield
Rockville
Hazard
Boelus
Dannebrog
St. Libory
Sweetwater
Pleasanton
Cairo
Chapman
Ovina
Grand Island
Alda
Wood River
Buffalo
Amherst
Riverdale
Shelton
Elm Creek
Kearney
Gibbon
Odessa
Denman
Doniphan
Trumbull
Eldorado
Fairmont
Exeter
Harvard
Sutton
Hastings
Newark
Lowell
Heartwell
Kenesaw
Juniata
Inland
Saronville
Clay Cen.
Verona
Geneva
Milligan
Fillmore
Saline
Wilber
Clatonia
Pickrell
Tecumseh
Vesta
Johnson
Nemaha
Auburn
Brownville
Phelps
Kearney
Adams
Clay
Minden
Holstein
Roseland
Martland
Strang
Tobias
De Witt
Cortland
Adams
Sterling
Graf
Rohrs
Howe
Nemaha
Holdrege
Funk
Axtell
Keene
Pauline
Fairfield
Shickley
Ohiowa
Western
Swanton
Gage
Crabb
Orchard
Elk Creek
Shubert
Atlanta
Wilcox
Hildreth
Ragan
Lawrence
Sedan
Plymouth
Beatrice
Filley
Lewiston
Steinauer
Stella
Barada
Mascot
Upland
Campbell
Bladen
Blue Hill
Rosemont
Angus
Oak
Carleton
Belvidere
Alexandria
Powell
Jefferson
Harbine
Ellis
Table Rock
Pawnee City
Richardson
Verdon
Franklin
Macon
Webster
Nuckolls
Hebron
Deshler
Gilead
Fairbury
Wymore
Burchard
Huntsboldt
Falls City
Rulo
Orleans
Cowles
Nelson
Nora
Ruskin
Thayer
Glad-stone
Diller
Odell
Barneston
Pawnee
DuBois
Salem
Preston
Almena
Franklin
Red Cloud
Guide Rock
Catharine
Superior
Chester
Hardy
Byron
Epicure
Reynolds
Steele City
Hubbell
Lanham
Republican City
County Res.
Bloomington
Inavale
Bostwick
Sabetha
Hiawatha
Marysville
Seneca
Burr Oak
Belleville
Republican
Mankato
Cuba
Washington
Phillipsburg
Smith Cen.
Frankfort
Irving
Whiting
Solomon
Clifton
Concordia
Holton
Stockton
Downs
Westmoreland
Osborne
Beloit
Miltonvale
Clay Cen.
Valley Falls
Manhattan
Barnard
Minneapolis
Luray
Lincoln
Junction City
Alma
TOPEKA
KANSAS RIVER

NEBRASKA — *Continued*

Hickman	279	H 4
Hildreth	374	E 4
Hire	3	C 2
Hoagland	8	D 3
Holbrook	398	D 4
Holdrege	4,381	E 4
Hollinger	20	E 4
Holmesville	110	H 4
Holstein	187	F 4
Homer	345	H 2
Hooper	859	H 3
Horace	12	F 3
Hordville	116	G 3
Hoskins	171	G 2
Howard City (Boelus)	167	F 3
Howe	75	J 4
Howells	784	H 3
Hubbard	145	H 2
Hubbell	199	G 4
Humboldt	1,404	J 4
Humphrey	761	G 3
Huntley	98	E 4
Hyannis	432	C 3
Imperial	1,563	C 4
Inavale	188	F 4
Indianola	738	D 4
Ingham	21	D 4
Inland	100	F 4
Inman	237	F 2
Irwin	4	C 2
Ithaca	140	H 3
Jackson	200	H 2
Jamison	50	E 2
Jansen	244	G 4
Johnson	262	J 4
Johnstown	109	D 2
Julian	123	J 4
Juniata	365	F 4
Kearney	12,115	E 4
Keene	6	F 4
Kenesaw	584	F 4
Kennard	273	H 3
Kennedy	12	D 2
Keystone	55	C 3
Kilgore	189	D 2
Kimball	2,048	A 3
Koshopah	6	E 2
Kramer	60	H 4
Lakeside	175	B 2
Lamar	81	C 4
Lanham	75	H 4
Laurel	944	G 2
Lawrence	376	F 4
Lebanon	213	D 4
Leigh	551	G 3
Lemoyne	29	C 3
Lena		C 3
Leshara	61	H 3
Lewellen	510	B 3
Lewiston	94	H 4
Lexington	5,068	E 4
Liberty	246	H 4
LINCOLN	98,884	H 4
Lindsay	247	G 3
Linwood	168	H 3
Lisco	150	B 3
Litchfield	337	E 3
Lodgepole	555	B 3
Logan		D 3
Loma	50	G 3
Long Pine	567	E 2
Loomis	218	E 4
Lorenzo	40	A 3
Loretto	101	F 3
Lorton	75	H 4
Louisville	1,014	H 3
Loup City	1,508	E 3
Lowell	49	F 4
Lushton	60	G 4
Lyman	666	A 3
Lynch	440	F 2
Lyons	1,011	H 3
Macon	50	E 4
Macy	356	H 2
Madison	1,663	G 3
Madrid	379	C 4
Magnet	115	G 2
Malcolm	93	H 4
Malmo	151	H 3
Manley	93	H 4
Mariaville	3	E 2
Marion	100	D 4
Marquette	218	G 4
Marsland	84	A 2
Martinsburg	79	H 2
Martland	10	G 4
Mary	5	E 2
Mascot	48	E 4
Maskell	84	H 2
Mason City	305	E 3
Max	135	C 4
Maxwell	347	D 3
Maywood	409	D 4
McCook	7,678	D 4
McCool Jct.	297	G 4
McGrew	105	A 3
McLean	67	G 2
Mead	388	H 3
Meadow Gr.	461	G 2
Meadville	7	E 2
Melbeta	138	A 3
Melpha	10	C 2
Memphis	92	H 3
Merna	385	E 3
Merriman	260	C 2
Middlebranch	2	F 2
Milburn	18	E 3
Milford	951	H 4
Millard	391	H 3
Miller	179	E 4
Milligan	367	G 4
Mills	48	E 2
Minatare	890	A 3
Minden	2,120	F 4
Mitchell	2,101	A 3
Monowi	67	F 2
Monroe	269	G 3
Moorefield	58	D 4
Morrill	849	A 3
Morse Bluff	142	H 3
Mount Clare	35	F 4
Mullen	652	C 2
Murdock	225	H 4
Murphy	20	F 4
Murray	244	J 4
Mynard	45	J 4
Nacora		H 2
Naper	188	E 2
Naponee	391	E 4
Nebr. City	6,872	J 4
Nehawka	272	H 4
Neligh	1,822	G 2
Nelson	806	F 4
Nemaha	288	J 4
Nenzel	24	C 2
Newark	30	E 4
Newcastle	426	H 2
Newman Gr.	1,004	G 3
Newport	207	E 2
Nickerson	140	H 3
Niobrara	577	G 2
Nonpareil		A 2
Nora	88	G 4
Norden	32	D 2
Norfolk	11,335	G 2
Norman	68	F 4
North Bend	906	H 3
North Loup	526	F 3
N. Platte	15,433	D 3
Northport	164	B 3
Oak	131	G 4
Oakdale	502	F 2
Oakland	1,456	H 3
Obert	91	G 2
Oconto	258	E 3
Octavia	103	G 3
Odell	420	H 4
Odessa	132	E 4
O'Fallons	30	D 3
Ogallala	3,456	C 3
Ohiowa	253	G 4
Omaha	251,117	J 3
O'Neill	3,027	F 2
Ong	173	G 4
Orafino	11	D 4
Orchard	458	F 2
Ord	2,239	F 3
Orella	17	A 2
Orleans	956	E 4
Osceola	1,098	G 3
Oshkosh	1,124	B 3
Osmond	732	G 2
Otoe	230	H 4
Overton	497	E 4
Ovina	20	F 4
Ovitt	4	E 2
Oxford	1,270	E 4
Page	275	F 2
Palisade	694	C 4
Palmer	434	F 3
Palmyra	372	H 4
Panama	168	H 4
Papillion	1,034	J 3
Parks	150	C 4
Paul	23	J 4
Pauline	70	F 4
Pawnee City	1,606	H 4
Paxton	606	C 3
Pender	1,167	H 2
Peru	1,265	J 4
Petersburg	508	G 3
Phillips	190	F 4
Pickrell	161	H 4
Pierce	1,167	G 2
Pilger	512	G 2
Plainview	1,427	G 2
Platte Ctr.	422	G 3
Plattsmouth	4,874	J 3
Pleasant Dale	163	G 4
Pleasant Hill	29	G 4
Pleasanton	188	E 4
Plymouth	348	G 4
Polk	508	G 3
Ponca	893	H 2
Poole	33	F 4
Posen(Farwell)	172	F 3
Potter	421	A 3
Powell	70	G 4
Prague	396	H 3
Preston	81	J 4
Primrose	154	F 3
Prosser	81	F 4
Purdum	21	D 2
Rackett	2	B 3
Raeville	82	F 3
Ragan	102	E 4
Ralston	1,300	J 3
Randolph	1,029	G 2
Ravenna	1,451	F 4
Raymond	196	H 4
Red Cloud	1,744	F 4
Red Willow	10	D 4
Redbird	13	F 2
Redington	18	A 3
Republican City	580	E 4
Reynolds	166	G 4
Richland	141	G 3
Riford		A 3
Ringgold	28	D 3
Rising City	374	G 3
Riverdale	134	E 4
Riverton	348	F 4
Riverview		E 2
Roca	105	H 4
Rockville	164	F 3
Rogers	113	H 3
Rohrs	8	J 4
Rosalie	212	H 2
Roscoe	95	C 3
Rose	3	E 2
Roseland	154	F 4
Rosemont	42	F 4
Royal	157	F 2
Rulo	639	J 4
Rushville	1,266	B 2
Ruskin	214	G 4
Sacramento	7	E 4
Saint Ann	11	D 4
Saint Edward	917	G 3
Saint Helena	77	G 2
Saint Libory	142	F 3
Saint Mary	56	H 4
Saint Michael	12	F 4
Saint Paul	1,676	F 3
Salem	341	J 4
Santee	175	G 2
Sarben	100	C 3
Sargent	818	E 3
Saronville	87	G 4
Schuyler	2,883	G 3
Scotia	474	F 3
Scottsbluff	12,858	A 3
Scribner	913	H 3
Sedan	10	G 4
Seneca	219	D 2
Seward	3,154	H 4
Shelby	624	G 3
Shelton	1,032	F 4
Shickley	316	G 4
Sholes	32	G 2
Shubert	295	J 4
Sidney	4,912	B 3
Silver Creek	444	G 3
Simeon	6	D 2
Smithfield	102	E 4
Snyder	369	H 3
Somerset		D 4
South Bend	100	H 4
S. Sioux City	5,557	H 2
Spalding	713	F 3
Sparks	5	D 2
Spencer	540	F 2
Sprague	110	H 4
Springfield	377	H 3
Springranch	25	F 4
Springview	298	E 2
Stamford	265	E 4
Stanton	1,403	G 3
Staplehurst	224	G 4
Stapleton	363	D 3
Star	5	F 2
Steele City	214	G 4
Steinauer	141	H 4
Stella	324	J 4
Sterling	547	H 4
Stockham	82	F 4
Stockville	181	D 4
Strang	100	G 4
Stratton	628	C 4
Stromsburg	1,231	G 3
Stuart	785	E 2
Sumner	267	E 4
Sunol	120	B 3
Superior	3,227	G 4
Surprise	120	G 3
Sutherland	856	C 3
Sutton	1,353	G 4
Swanton	203	H 4
Swedeburg	54	H 3
Sweetwater	10	E 3
Syracuse	1,097	H 4
Table Rock	513	H 4
Talmage	398	H 4
Tamora	91	G 4
Tarnov	74	G 3
Taylor	311	E 3
Tecumseh	1,930	H 4
Tekamah	1,914	H 3
Terrytown	228	A 3
Thayer	90	G 4
Thedford	275	D 3
Thune	12	C 3
Thurston	156	H 2
Tilden	1,033	G 2
Tobias	240	G 4
Touhy	39	H 3
Trenton	1,239	D 4
Trumbull	150	F 4
Tryon	150	C 3
Uehling	250	H 3
Ulysses	374	G 3
Unadilla	216	H 4
Union	277	J 4
Upland	251	F 4
Utica	550	G 4
Valentine	2,700	D 2
Valley	1,113	H 3
Valparaiso	392	H 3
Venango	233	C 4
Venus	10	F 2
Verdel	142	F 2
Verdigre	570	F 2
Verdon	366	J 4
Verona	25	G 4
Vesta	75	H 4
Virginia	113	H 4
Waco	180	G 4
Wahoo	3,128	H 3
Wakefield	1,027	H 2
Wallace	361	C 4
Walnut	25	F 2
Walthill	958	H 2
Walton	81	H 4
Wann	48	H 3
Washington	55	H 3
Waterbury	141	H 2
Waterloo	382	H 3
Wauneta	926	C 4
Wausa	708	G 2
Waverly	310	H 4
Wayne	3,595	G 2
Wayside	5	A 2
Weeping Water	1,070	J 4
Weissert	12	E 3
Wellfleet	93	D 4
Wells	3	C 2
W. Lincoln	426	H 4
West Point	2,658	H 3
Western	434	G 4
Westerville	50	E 3
Weston	345	H 3
Whiteclay	80	B 2
Whitman	180	C 2
Whitney	132	A 2
Wilber	1,356	G 4
Wilcox	296	E 4
Willow Isl.	88	D 4
Wilsonville	327	D 4
Winnebago	684	H 2
Winnetoon	120	F 2
Winside	454	G 2
Winslow	138	H 3
Wisner	1,233	H 3
Wolbach	442	F 3
Wood Lake	238	D 2
Wood River	858	F 4
Wymore	2,258	H 4
Wynot	233	G 2
York	6,178	G 4
Yutan	287	H 3

SCENES IN A PROGRESSIVE PRAIRIE STATE



1. Fine dairy herds graze on the prairie. 2. Agriculture is scientifically developed at the agricultural school of the University of Nebraska at Lincoln. 3. Corn is a leading crop of eastern Nebraska. 4. Large elevators at Fremont attest the importance of the wheat crop. 5. In the efficient packing houses of Omaha thousands of farm animals are processed daily. 6. The famous Boys Town for homeless boys, near Omaha. 7. The capitol at Lincoln symbolizes the state's achievements.

There were wooded sections in some of the uplands. In 1872 J. Sterling Morton of Nebraska City started Arbor Day (*see* Arbor Day). His home, Arbor Lodge, is now a state park. Because of his efforts and those of other planters the state now has many trees near farmhouses and city homes, and along roadways.

Nebraska's History

Coronado probably reached the Nebraska region in his explorations in 1540–42. In 1739 the Mallet brothers and eight Frenchmen explored and named the Platte River, which they followed from its mouth on their way to Santa Fe, N. M.

In 1803 Nebraska passed to the United States as part of the Louisiana Purchase (*see* Louisiana Purchase). Between 1810 and 1826 the American Fur Company established posts at Bellevue, Omaha, and Nebraska City. Bellevue, a little below Omaha, was Nebraska's first white settlement. From 1812 to 1821 Nebraska was part of Missouri Territory; then it reverted to the public domain as "Indian country."

Breaking the federal law against entering Indian territory, squatters pushed in and set up farms on the land. More came and settled there. In 1854 Nebraska and Kansas became territories, under Senator Douglas' plan to let the settlers decide the slavery question (*see* Kansas-Nebraska Act). With the forming of the Dakota, Colorado, and Idaho territories, Nebraska was reduced to about its present limits. In 1864 Congress passed an enabling act to make Nebraska a state; but not until 1867 was a constitution framed and accepted by Congress (over President Johnson's veto). Before the year ended, a dispute over the location of the capital was settled by choosing a site at Lancaster and renaming the place Lincoln. Teams hauled building material 40 miles or more to the site, and in 1869 the capital city was incorporated.

Completion of the Union Pacific to the western state line in 1867 brought floods of immigrants, largely former Union soldiers. The grasshopper plague of 1874–75 caused the constitution of 1875 (known as the "Grasshopper Constitution") to be framed, with a view to economy. A war with the Sioux Indians during 1874–77 ended in the removal of the Indians from the state. The next great immigration period (1880–90) was marked by conflicts between cattle men and homesteaders. Droughts in 1890 and 1894 caused great suffering, and led to the introduction of irrigation and dry farming, with cultivation of sugar beets, winter wheat, and alfalfa as staples. In 1900 the farmers established coöperative elevators to combat the charges of grain dealers and railroads.

In 1919 the legislature made drastic changes in the state government, and in 1920 the voters approved extensive amendments to the state constitution. A 1934 amendment provided for a legislature of one chamber, with 43 members. (*See also* chronology and government section in Nebraska Fact Summary.)

Colleges and Cities of the Cornhusker State

The University of Nebraska is at Lincoln and has a medical college and a nursing school at Omaha and a school of agriculture at Curtis. Its agronomy farm is at Havelock; a fruit farm at Union; and agricultural substations at North Platte, Scottsbluff, and Valentine. Other schools of higher learning include Creighton University at Omaha, Nebraska Wesleyan University at Lincoln, and state teachers colleges at Chadron, Kearney, Peru, and Wayne.

Omaha, the chief industrial center, and Lincoln, the capital, are in eastern Nebraska (*see* Omaha; Lincoln). Grand Island, in east-central Nebraska, is an important division point on the Union Pacific Railroad. Hastings, to the south, is in the wheat belt. North Platte and Scottsbluff are leading cities of the western part of the state. Fremont, near Omaha, is in a rich farm area. (*See also* United States, sections "North Central Plains", "Great Plains.")

NEBULAE. When astronomers first explored the sky with telescopes they saw many patches of luminous mist or haze. They called such a patch a *nebula*, from the Latin word for "mist" or "small cloud." Since the late 1800's, scientists have learned much about the universe from these patches.

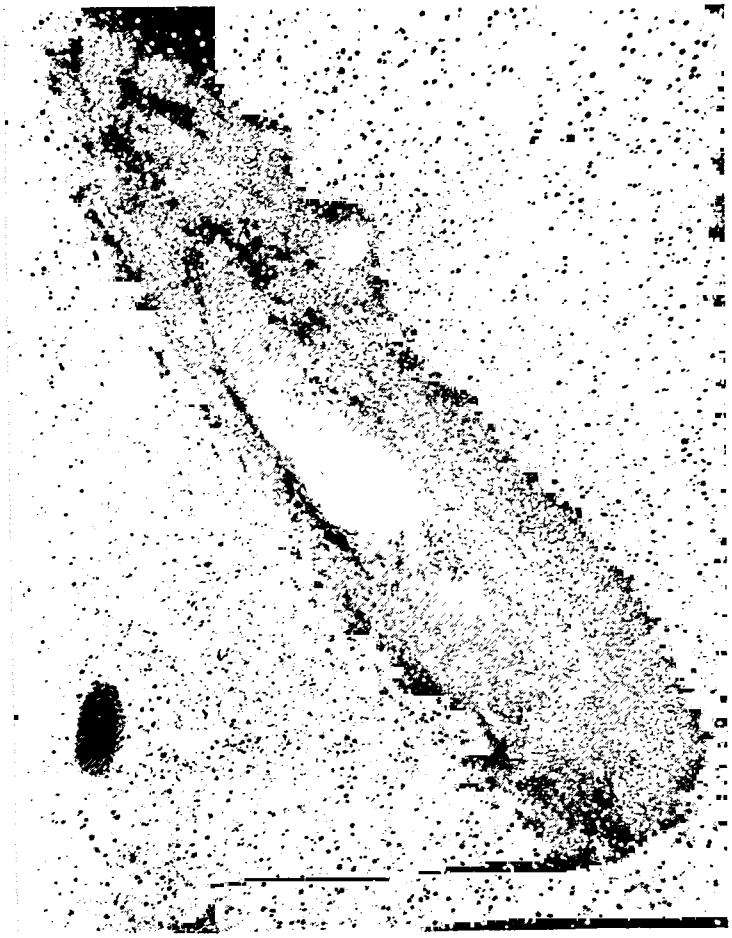
For some centuries astronomers have recognized different types of nebulae. The nebula we see in the sword belt of Orion is *diffused*, appearing to be a chaotic, turbulent mass of glowing gas. Some diffuse nebulae are more mistlike, or exist in wisps; the Pleiades are pervaded by such a nebula. The *planetary* type is a glowing ring, with or without a bright star at the center. Most remarkable of all in appearance are the *spiral* nebulae, with twisted arms reaching out from a glowing center.

In 1864 William Huggins, using the newly invented spectroscope (*see* Spectrum and Spectroscope), found that some nebulae are vast clouds of luminous gases. Later E. E. Barnard proved that the curious "dark spots" or "holes" in the Milky Way are *dark* nebulae, composed of matter which does not give off light. Then scientists found how to make the spectroscope reveal pressure and temperature conditions of heavenly bodies, as well as their chemical constitution. From this they could estimate how much light a nebula should give and so get a good clue to its distance from its brightness.

Soon hitherto undreamed of facts were discovered. The nebula in the Pleiades was found to be 220 "light-years" away, and 30 "light-years" across. To understand what these figures mean, let us compare them with the dimensions of the solar system. This system is so immense that if the earth were the size of a pea, the planet Pluto would be at the edge of a circle $3\frac{1}{3}$ miles in diameter. The nearest star would be 7,500 miles away. But the Pleiades nebula is so huge that it could contain not only the solar system and the nearest star, but many other stars as well.

In the last few years we have learned that the spiral nebulae are more amazing still. Scientists had previously observed, that, while all other types of nebula were to be found in the Milky Way, the spiral type always was found outside. This fact and others led scientists to believe that the stars are not distributed uniformly throughout the universe, as was

THE GREAT NEBULA IN ANDROMEDA



This great mass of glowing gas, millions of miles across, is just visible to the naked eye as a fuzzy star in the girdle of Andromeda. The picture shows how it looks through a high-power telescope.

formerly supposed. Instead, they seem to be gathered into groups, so vast that the mind scarcely can conceive their size. These groups are called *galaxies*, or "island universes." The earth and the solar system and all the stars the eye sees make up one galaxy, but there are thousands of others.

After the first World War, astronomers began to find amazing facts about the place of the spiral nebulae among the galaxies. The size of the Pleiades nebula seems huge, yet it is only 30 light-years across. Our own galaxy is thousands of times greater. Its diameter is figured in scores of thousands of light-years. The spiral nebula in Andromeda is probably 900,000 light-years away. The light by which we see it tonight started on its way so long ago that the span of time back to the Stone Age seems slight in comparison. Other spirals lie at similar distances.

The pioneer in such studies was the astronomer Laplace (*see* Laplace). In 1796 he advanced the *nebular hypothesis*, which held that our solar system was a condensed nebula (*see* Planets). Nebulae of such size as to be visible 900,000 light-years away are no mere solar systems in the making. Each one is as large as an entire galaxy like our own. Moreover, each spiral nebula seems to be rotating and throwing off matter at its "rim." This matter may condense into stars. So when we look at the nebula in Andromeda, we may be seeing an entire galaxy in process of creation. The other types of nebulae, it is thought, will in the course of stellar evolution condense into groups, or "clouds," of stars within single galaxies.

Nebulae are extraordinarily difficult to study, because only the largest telescopes can gather light enough to tell much about objects so far away. When we realize their colossal size, we can see why scientists find them so fascinating and why they make larger and better telescopes to study them.

NEEDLE. The modern steel needle is slim, highly polished, and tapered to a sharp point. The edges of the eye are rounded and the inside ground smooth so that the thread will not catch or fray. By comparison, the needles of even a century ago were crude. They were badly formed, one side flatter than the other, and the head considerably larger than the body. Yet even these were a great advance over the needles of primitive and ancient peoples. The earliest needles were made of fishbone, stone, iron, and bronze. Some had the eye in the point; some had it in the center of the shaft. Some had no eye at all; these were used to punch holes through which leather thongs or plant fibers were laced.

Modern needle manufacture begins with cutting steel wire into pieces the length of two needles. The ends are ground to sharp points, and eyes are drilled side by side at the center of each length. Then the lengths are cut in half between the eyes. The heads are filed into shape, and finally the needles are ground, polished, tempered, and packed into papers or boxes.

Hand sewing needles come in 12 sizes. Nos. 10 to 12, the finest, are used with thread of sizes 100 to 200 (*see* Thread). No. 9 needle takes sizes 80 to 100 thread; No. 8 takes 70 to 90; No. 7 takes 60 to 80; No. 6 takes 40 to 60; No. 5 takes 36 to 40; No. 4 takes 24 to 36; and Nos. 1 to 3 are used with 8 to 24 thread. Other varieties of needles are for use on sewing machines and for hand sewing heavy materials.

NEGROES, AMERICAN. From time to time in all parts of the world various racial, national, and religious minorities have been limited in the rights, privileges, and opportunities accorded to others. Sometimes the limits were created for political or economic reasons; or they arose from the misunderstandings that can occur when physical differences in people or their different customs are easily seen. Sometimes the limitations resulted from firm and fervid religious beliefs; at other times they seemingly can be ascribed only to bigotry and prejudice. Whatever the reasons, minority groups frequently have not been permitted to participate fully in the total life of the country.

As a very large and easily recognized minority group, Negroes in the United States have long been

faced with limitations of their rights and opportunities. Negro leaders and many white leaders have urged that these restrictions be lifted. Clearly evident progress has been made. Civil rights once denied the Negro are being granted; employment opportunities are constantly being extended; educational opportunities have been made increasingly available, with marked improvement in facilities for Negro education.

American gains from these changes are equally clear. Many Negroes in the United States have made important contributions to national welfare. Many have achieved eminence. Negroes in the United States and the other Americas now fill important positions in the arts, sciences, education, entertainment, the professions, business, sports, and public service. Dr. Ralph J. Bunche, a high-ranking United Nations official, won the 1950 Nobel peace prize for his work as mediator in the 1948–49 Arab-Jewish disputes in Palestine (*see* Bunche). William H. Hastie, an attorney, became governor of the Virgin Islands and later a judge in the United States Court of Appeals. Marian Anderson and Dorothy Maynor received exceptional acclaim as concert artists and Henry T. Burleigh as a composer and arranger. In literature W. E. B. Du Bois, Richard Wright, Gwendolyn Brooks, and Ralph Ellison won wide recognition. In painting and sculpture, Henry O. Tanner, Archibald Motley, and Richmond Barthe were outstanding. Negro scientists such as Percy L. Julian and George Washington Carver made important contributions in chemistry, as did E. F. Frazier, Abram Harris, C. S. Johnson, and R. W. Logan in the social sciences (*see* Carver).

The Negro Population of the Americas

Negroes in the Americas are descendants of the Negro peoples of Africa (*see* Races of Mankind). The first Negroes in the American Colonies were 20 slaves brought to Virginia in 1619. Negroes were brought to this country in large numbers, mainly from the west coast of Africa, until the slave trade was forbidden by constitutional provision in 1808. Some Negroes came in long after 1808. In the first federal census (1790) 757,000 Negroes were recorded. In 1808 there were about 1,400,000 Negroes in the United States, and by the close of the Civil War, about 4½ million. In 1790 more than 90 per cent of the Negro population lived in the South; this distribution remained about the same until 1910. Thereafter Negroes became more widely dispersed. In 1950 the Bureau of the Census estimated that less than 69 per cent of the Negro group lived in the South.

At the time of the Emancipation Proclamation in 1863, only about 10 per cent of the Negroes in the United States were free. Thus the great majority of American Negro slaves acquired freedom suddenly and at the same time. Most of the former slaves were unprepared for independence, and many white people were unable to accept the changed relationship. In addition, the disillusionment, confusion, and corruption which follow any major war were part of American life during the Reconstruction period (*see* Civil War, American; Reconstruction Period).

Many people of the Americas are of mixed racial ancestry, resulting from intermarriage of Negroes with white people, and in some countries with American Indians. In the United States, persons with any Negro ancestry are considered to belong to the Negro race. In some American countries, such as Brazil and Cuba, persons whose ancestry is mainly Caucasoid are regarded as white. In the British West Indies a distinction is frequently made between "black" and "colored" persons.

The Brazilian government makes no official census count by race; hence estimates vary as to the proportion of the population which has some Negro ancestry. About one third of the Brazilian people are Negro or Negro-white. The percentage of Negroids is much higher in the West Indies countries; in some, the Negro group is overwhelmingly preponderant. The United States has about 15 million Negroes. They represent about one tenth of the total continental population. An estimated 60 to 75 per cent of these people have some degree of white ancestry and a sizable number have some American Indian ancestry.

Opportunities in Employment and Education

Although employment policies of some companies and admission rules to some labor unions exclude Negroes, in the last few decades hundreds of thousands of Negroes have shifted from farm work or from personal and domestic service to industrial work. Most industrial unions, as distinguished from trade unions, do not discriminate against Negroes. In the second World War a presidential executive order established a Fair Employment Practices Committee (FEPC). This was to eliminate employment discrimination by employers or labor organizations in defense industries or government because of race, religion, or national origin. Federal FEPC was discontinued in 1946, but, starting in 1945, 11 states passed similar fair employment legislation. The marked change since 1910 in the number of Negroes who live in cities, in both the North and the South, has resulted in new job opportunities. This increased urbanization has also given rise to many problems in schooling, housing, and recreation. The gap between the average earning of whites and Negroes is slowly narrowing.

Until after the Civil War no serious large-scale effort was made to educate Negroes. In fact, slaves were often forbidden by law to learn to read and write. Public and private schools for Negroes were started after the Civil War. The Freedmen's Bureau provided government aid from 1865 to 1870. Hampton Institute, opened 1868, was one of the first private schools for Negroes. From 1868 to 1954 a total of 20 states, mainly Southern, and the District of Columbia operated separate public schools for Negroes. In 1954 the United States Supreme Court handed down a decision abolishing segregated schools. Attorneys for the states were permitted to appear before the court to argue the form of the nonsegregation orders.

The number of Negro college students has increased considerably since 1930. In a 1950 case in-

volving the admission of a Negro applicant to a state university law school, the United States Supreme Court refused to affirm the 54-year-old precedent that "separate but equal" facilities do not violate the equal protection clause of the 14th Amendment. In another case involving a graduate student at a state university, the Supreme Court held that restrictions and special provisions handicapped him in effectively pursuing his instruction.

Since 1948 three states—New York, New Jersey, and Massachusetts—have enacted fair educational practices laws. Supreme Court decisions since 1946 have ruled against segregation on interstate buses, railroad passenger cars and dining cars, and in 1952 against separate railroad cars and buses in intrastate travel.

Negro people in the South, largely disfranchised from about 1877 until the Supreme Court "white primary" decision of 1944, have voted in increasingly larger numbers. An estimated $1\frac{1}{2}$ million southern Negroes voted in the 1952 elections and about $2\frac{1}{2}$ million Negroes now vote in the North and West. The number of Negroes in appointive political positions, especially in the larger Northern cities, has increased considerably since 1930.

NEHRU (*nā'ru*), JAWAHARLAL (born 1889). For 20 years Nehru worked with Gandhi to free India from British rule. The two great leaders achieved their goal in 1947, when India became an independent nation within the British Commonwealth. Nehru became the first prime minister of the new India.

Nehru was born in Allahabad in 1889. His ancestors were Kashmiri who took the family name Nehru from their Delhi residence near a canal, or *nahar*. His father was a wealthy lawyer. When the boy was 15 he went to England. There he studied at Harrow and Cambridge. He returned to India in 1912 and became a lawyer in Allahabad.

PANDIT NEHRU



He worked to free India and became its first prime minister.

Meeting Gandhi in 1916, he soon became absorbed in Gandhi's campaign for Indian independence (*see* Gandhi). He joined the Congress party and in 1929 became its leader. Between 1923 and 1945 he spent eight terms as a political prisoner in British jails. There he wrote his autobiography, 'Toward Freedom' (1935). Between prison terms he traveled all over India winning popular support for Gandhi's program of nonviolent resistance to British rule. The masses revered him and called him "Pandit" (the wise man).

The Pandit was equally at home in the cultures of India and the West. From Western progress he drew what he believed was best for India. He disliked Gandhi's idealization of the simple life and preferred modern cotton mills to hand spinning. As prime minister he aimed to make India a democratic socialist nation, tolerant of all religions. He was returned to office in the national election of 1952.

NELSON, ADMIRAL HORATIO (1758–1805). The most famous of all British sea fighters was Viscount Nelson. His brilliant victories during the Napoleonic wars put down the alarming threat of French naval power and saved England from invasion.

LORD NELSON



"England expects that every man will do his duty."

Horatio Nelson was born in Norfolk in the parish of Burnham-Thorpe, where his father was rector. He entered the navy as a midshipman at the age of 12. When war broke out with revolutionary France (1793) he was given command of the 64-gun ship *Agamemnon,* then in the Mediterranean. He lost the sight in his right eye in the siege of Calvi, on the island of Corsica, in 1794. A year later he lost his right arm during an assault on Santa Cruz in the Canary Islands

The Battle of the Nile

As soon as Nelson had recovered, he was sent to hunt out and destroy the fleet which escorted Napoleon's invasion of Egypt. On Aug. 1, 1798, he discovered the French ships in one of the mouths of the Nile, Aboukir Bay. "Where there is room for a French ship to swing at anchor," he said, "there is room for an English ship to sail." So he boldly sent half his fleet into the narrow space between the French ships and the shore and then raked the enemy from both sides. This smashing victory of the Nile made Nelson the hero of England. High honors were heaped upon him, including his elevation to the peerage as a baron.

In 1801 Nelson won a notable victory over the Danish fleet at Copenhagen. In the midst of the battle Nelson's superior hoisted the recall signal to withdraw from action. Nelson put the telescope to his blind eye and said, " I really do not see the signal." He thus turned probable disaster into triumph.

Nelson's Victory and Death at Trafalgar

A few months later Nelson was given command of the Mediterranean fleet. He blockaded the French fleet at Toulon for 14 months. Then it slipped out. Nelson chased it to the West Indies and back; laid siege to it and the allied Spanish fleet in the harbor of Cadiz; and finally brought them both to bay off Cape Trafalgar (Oct. 21, 1805). From his ship, the *Victory,* he flew the signal that has ever since been Britain's watchword: "England expects that every man will do his duty." Nelson's inspired tactics shattered the enemy fleet. Of 33 warships, only 11 escaped. French naval power was suddenly blotted out.

While the battle still raged, Nelson fell mortally wounded. His flag captain, Thomas Hardy, carried him below deck. Just before he died Nelson turned to his comrade and said, "Kiss me, Hardy." His last words were, "I have done my duty, thank God."

NEPAL (*nĕ-pôl'*). The small independent kingdom of Nepal is wedged between India and Tibet. It measures 500 miles from east to west and from 90 to 140 miles from north to south.

The loftiest of the Himalayan ranges is on or near the border between Nepal and Tibet. Mount Everest, at this border's eastern end, is the world's highest mountain (*see* Everest). From this range the land drops to warm valleys in the south. The lowlands are mainly covered with swamp, jungle, and forest. On the land that can be farmed the people raise rice and other grains, vegetables, fruits, and flowers. The Nepalese are of Mongol and Hindu origin and their religion is a mixture of Buddhism and Hinduism. Thousands of shrines dot the country—white Buddhist mounds with painted eyes and richly carved Hindu temples.

A Hindu ruling class has for centuries held political power with the aid of the Gurkhas, a caste of famous fighting men. The king, whose capital is Katmandu, was for more than 100 years virtually a captive of a line of hereditary prime ministers. A revolution in 1950 broke the ministers' power and the king promised popular elections for 1954.

Nepal long remained isolated. Great Britain established relations with the country in 1815 and recruited Gurkhas for its army. After the second World War, Nepal accepted Point Four aid from the United States and joined UNESCO in 1953. Area, 54,000 square miles; population (1949 est.), 6,910,000.

NEPTUNE. In Roman mythology the name Neptune is given to the Greek sea-god Poseidon. He is usually shown as a bearded man standing in a shell being drawn over the sea and holding a three-pronged spear, or trident (*see* Poseidon).

An outer planet in our solar system is named Neptune. Its diameter is 3½ times that of the earth. It is 30 times farther from the sun and is invisible except through a powerful telescope (*see* Planets).

NERO, EMPEROR OF ROME (A.D. 37–68). Lucius Domitius Ahenobarbus, known as Nero, was one of the worst rulers in history. Through the scheming of his mother, Agrippina, he became emperor when Claudius died in A.D. 54. A temperate and popular ruler at first, he soon turned to tryanny. He had his stepbrother Britannicus poisoned in A.D. 55 and four years later had his mother killed. He divorced and later put to death his wife Octavia and murdered his second wife, Poppaea, in a fit of rage. A third woman who refused to marry him was slain, as was the husband of a fourth woman he wanted to marry. Worst of all, he had his old tutor, the aged Seneca, put to death, suspecting him of plotting his overthrow.

During his reign a fire destroyed two thirds of the city of Rome. It was rumored that Nero himself had started it and that, as he watched the fire, he recited verses on the burning of Troy while playing the lyre (the "fiddle" of tradition). To divert suspicion, he blamed the Christians and ordered them punished. This was the first major persecution under the Roman Empire.

After the fire, Nero set about rebuilding the city and erected for himself a magnificent palace called the Golden House. Heavy taxation and misgovernment caused revolt. Rebellious troops under Galba, the Roman governor of Spain, marched on Rome and when Nero's bodyguard joined them he fled to the country. Learning that a death sentence had been passed on him, he had an attendant stab him to death before he could be dragged to execution.

How the NERVES *Function in the* HUMAN BODY

NERVES. A human body operates as a smoothly functioning unit because hundreds of "communication lines" keep its various parts working together. These lines are the nerves, which run throughout the body. They vary in diameter from the thickness of thread to that of a lead pencil. Their length may be several feet or only a fraction of an inch. The brain, spinal cord, and nerves together make up the *nervous system* of the body. The brain and spinal cord comprise the *central nervous system*, and the nerves make up the *peripheral* ("outer") *nervous system.*

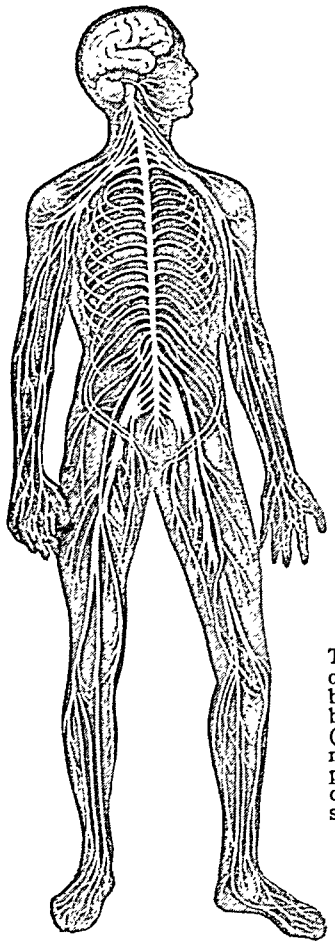
Every nerve pathway, no matter how long, is connected at one end with the central nervous system. A nerve carries its messages (*nerve impulses*) in only one direction. *Sensory* nerves transmit impulses from body parts to the brain and spinal cord; they signal the central nervous system when something is happening in or around the body. *Motor* nerves carry impulses from the central nervous system to parts of the body and bring about movements and adjustments of the muscles and glands. Nerves whose job is to control the internal organs, such as the heart, are known as *autonomic* ("self-governing") nerves (*see* Brain).

Structure and Arrangement of Nerves

Nerves are much like cables; they are bundles of varying numbers of separate microscopic fibers. It is these fibers that carry the nerve impulses. Many different messages can travel through a nerve at one time because the nerve fibers are separate from one another. Some nerves (*mixed nerves*) have both motor and sensory fibers. In these, messages travel in both directions at the same time but on different fibers.

The entire nervous system is built of individual cells called *neurons*. The nerve fibers are long, thread-like portions of neurons. Many fibers appear white because they are covered with a sheath of a fatty material called *myelin*. Such fibers make up the "white matter" of the nervous system. The "gray matter" is composed of bare fibers and cell bodies.

Every neuron, as shown in a drawing on the opposite page, has three main parts. The *cell body* carries on the functions for the neuron. It nourishes the neuron



COMMUNICATION SYSTEM OF THE BODY

The nervous system coordinates all parts of the body. It consists of the brain and spinal cord (which form the central nervous system) and the peripheral nerves throughout the body. This figure shows the distribution of these nerves.

and in peripheral nerves may even grow new fibers when the old ones are cut or torn. On one side of the cell body is the *dendrite* (in motor nerves there are several); this part of the neuron picks up impulses and transmits them as far as the cell body. From there, impulses are carried to their destination by the part of the neuron called the *axon*.

These three parts differ as to location and structure in motor and sensory nerves. The cell bodies of motor neurons lie in the brain or spinal cord. Their dendrites are short, branching tendrils that pick up impulses from neurons of the central nervous system. Their axons are long, some of them (such as those to the hands and feet) tremendously so.

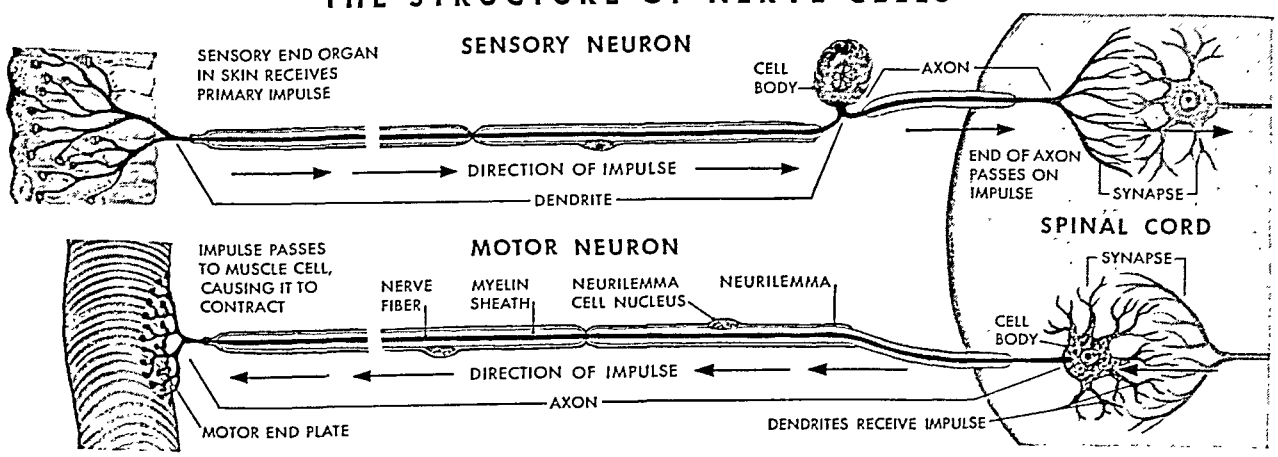
The cell bodies of most sensory neurons are located close to the central nervous system but outside it. In many instances cell bodies of neurons sharing a similar function are gathered together in clusters known as *ganglia* (singular, *ganglion*). Examples are the spinal ganglia, which lie in two rows alongside the spinal cord. These ganglia are focal points for incoming impulses and send them on to the spinal cord. Sensory impulses may originate in distant parts of the body, and so the dendrites of such neurons are very long and the axons relatively short.

The autonomic nerves, like other nerves, are either motor or sensory. These nerves are further divided into *parasympathetic* and *sympathetic* types, depending on what they do in controlling the internal organs. In most cases the two types have opposite effects on the various organs. For example, the sympathetic nerves make the heart beat faster and the parasympathetic slow it down. In general, the function of the sympathetic nerves is to adjust the internal organs when a person is ready for some heightened action, such as running or fighting. The parasympathetic nerves, on the other hand, function when he is resting or eating. The parasympathetic nerves join the spinal cord in the neck, or *cervical*, region and in the low back, or *sacral*, region. The sympathetic nerves join the cord between these two extremes—in the chest (*thoracic*) and middle back (*lumbar*) regions. The sympathetic nerves connect with the spinal cord after passing through their own ganglia (*sympathetic chain*) in the thoracic and lumbar regions.

The Nerve Impulse and the Synapse

Nerve fibers serve only to transmit nerve impulses. A nerve impulse travels along a neuron until it reaches the next neuron and the next and the next until it finally arrives at its destination.

THE STRUCTURE OF NERVE CELLS



Nerve cells are called neurons. In peripheral nerves, every pathway connects at one end with a body cell and at the other with the spinal cord or brain. Sensory neurons like the one shown here (top) carry impulses from the outer parts of the body to the spinal cord. There other neurons relay the impulses to the brain, which interprets them as pain, heat, cold, and so on. Motor neurons then carry impulses from the central nervous system to the muscles and glands, which in turn respond.

A nerve fiber at rest has a negative electric charge inside and a positive charge on its surface. When a nerve impulse starts, the wall of the neuron at that point loses its ability to keep the opposite charges separated, and the negative charge on the surface is temporarily lost at that spot. The affected part of the fiber wall, or membrane, is then said to be depolarized. Depolarization of this part of the membrane brings about depolarization in the next section, which in turn depolarizes the next portion, and so on along the neuron. This progression of the change in electrical charge along the neuron *is* the nerve impulse.

As soon as a nerve impulse has passed on its way, the fiber membrane regains its original polarity and is ready to pass along another nerve impulse. The time between passage of one impulse and the moment at which the fiber is ready for a second impulse is called the refractory period. During this time no impulse can be sent along that particular fiber. The length of the refractory period varies among fibers. Its duration determines how rapidly nerve impulses can follow one another. This repetition rate varies from ten to several hundred impulses a second. The transmission speed of the impulse also varies from fiber to fiber, ranging from only one foot a second up to as much as 300 feet a second.

The place at which a nerve fiber transmits its impulse to a muscle, gland, or another neuron is called a *synapse*. It is not certain how the nerve impulse passes across a synapse, but both electrical and chemical processes seem to be involved. Nerve impulses can cross a synapse in only one direction, and thus nerve fibers are limited to "one-way traffic."

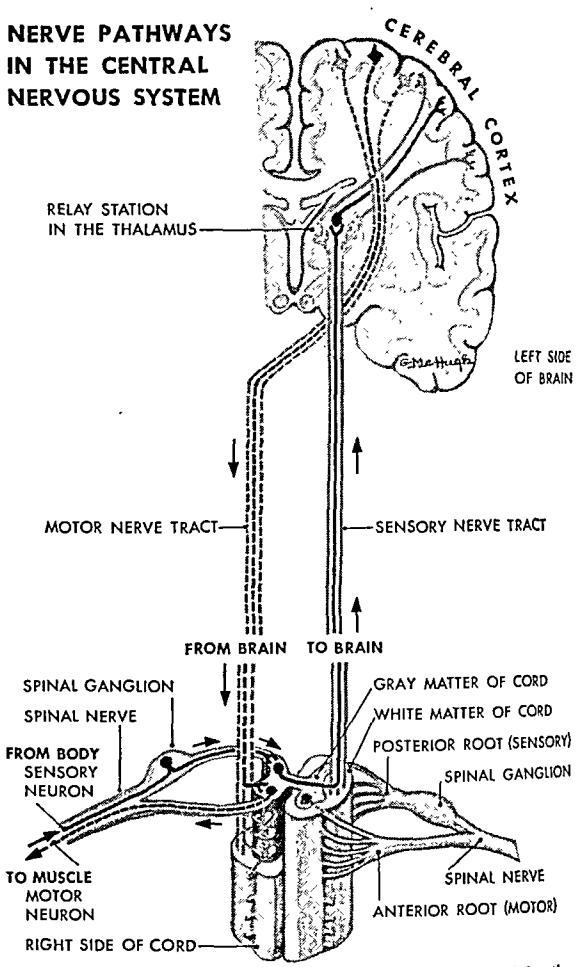
How Nerve Impulses Convey Information

If the sensory impulses coming into the brain require a bodily movement of a part—the forearm, for example—motor impulses are originated in the brain. These impulses are carried over motor nerves to muscles of the arm and cause them to contract (*see* Muscles). Muscles are composed of many individual muscle cells, each with its own nerve fiber. When a particularly strong movement is required, impulses are sent along a great many of these fibers, and hence more muscle cells are made to contract at once. If a faster movement is called for, impulses are sent in more rapid succession.

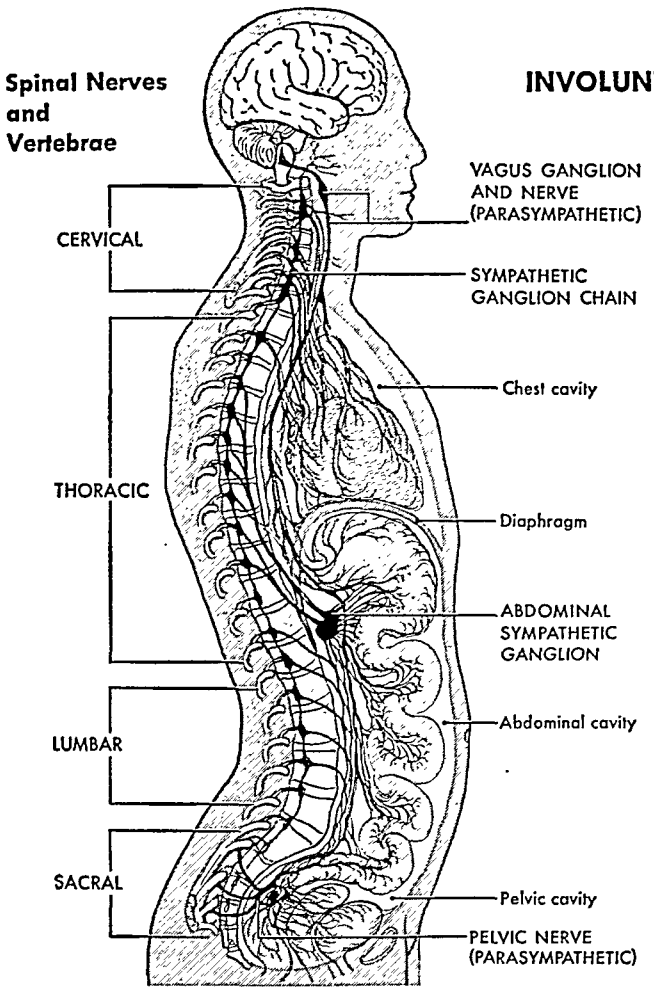
The functioning of sensory nerve fibers is more complex than this. With our eyes we can see different shapes, different colors, different brightnesses; we can tell, just by looking at something, how far away it is. With our sense of hearing we can distinguish sounds of different pitch and loudness, and even with eyes shut we know from which direction a sound has come. Our senses of taste, smell, and touch can detect equally complex things. All this information has to be carried to the brain by our nerves.

We will consider here only two types of sensory information: the intensity and the quality of sensation. By intensity is meant the amount or quantity of what we sense. For vision, intensity refers to the brightness or dimness of things we see; for hearing, the loudness or softness of sounds we hear. The quality of sensation, on the other hand, varies from sense to sense. For vision, quality refers to the color of things we see; for hearing, it means the pitch—the highness or lowness—of a sound. The sense of touch also detects different qualities; by touching something we can tell whether it is cold, hot, painfully sharp, smooth, or rough. In the same way, we can distinguish the different flavors or odors that are the "quality" aspects of taste and smell.

Intensity of sensation is handled by the nerves of all sense organs in much the same way. As a particular sensation becomes more intense (because of a light growing brighter, a sound louder, or a warm object hotter) the nerve fibers involved send an increasing number of nerve impulses to the brain. A nerve increases its number of impulses either by sending them faster or by using more fibers. It does not increase the size of the impulse, for a nerve fiber at any particular time can send only one size of impulse or none at all. This rule concerning nerve impulses is called the *all-or-none law*.



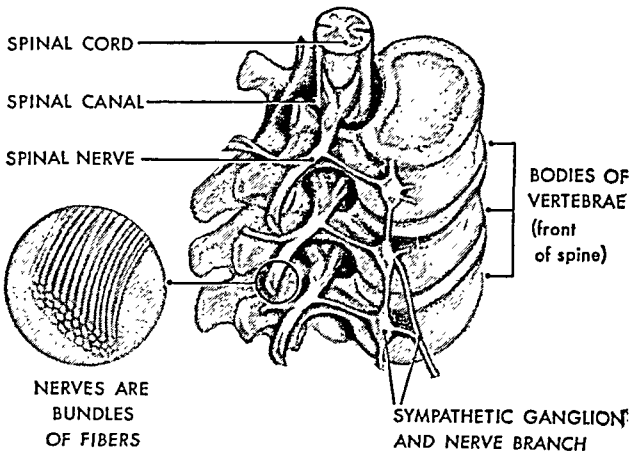
The so-called voluntary nervous system is controlled by the upper brain, or cerebrum. This diagram shows pathways taken by sensory and motor impulses. These pathways cross at some level in the brain or spinal cord. Thus the left side of the body is controlled by the right side of the brain.



INVOLUNTARY NERVES OF THE INTERNAL ORGANS

The autonomic nerves (shown at left in black) are controlled by the spinal cord and the lower centers of the brain. The sympathetic nerves branch from the spinal nerves (shown in white). They form a chain of ganglia which gives off branches to the internal organs. The parasympathetic vagus and pelvic nerves serve the same organs.

The Spinal Cord and Its Branches



Spinal nerves branch from the spinal cord between interlocking vertebrae, and sympathetic nerves in turn branch from them. A chain of sympathetic ganglia runs down each side of the spine.

The quality of our sensations, on the other hand, is determined by *which* nerve fibers are carrying the nerve impulses. In the optic nerve, for example, certain fibers respond only to red light, others to blue, and still others to green light. According to the most widely held theory, yellow is signaled to the brain when the red and green fibers carry nerve impulses to the brain in equal number. All the colors that we see are signaled to the brain by varying proportions of these three types of nerve fibers. Sounds of various pitch are likewise carried by different sets of nerve fibers, and the other sensory nerve fibers are specialized in similar ways. Our brain is able to handle these differences in quality of sensation because each type of fiber delivers its impulses to a different part of the brain (*see* Brain).

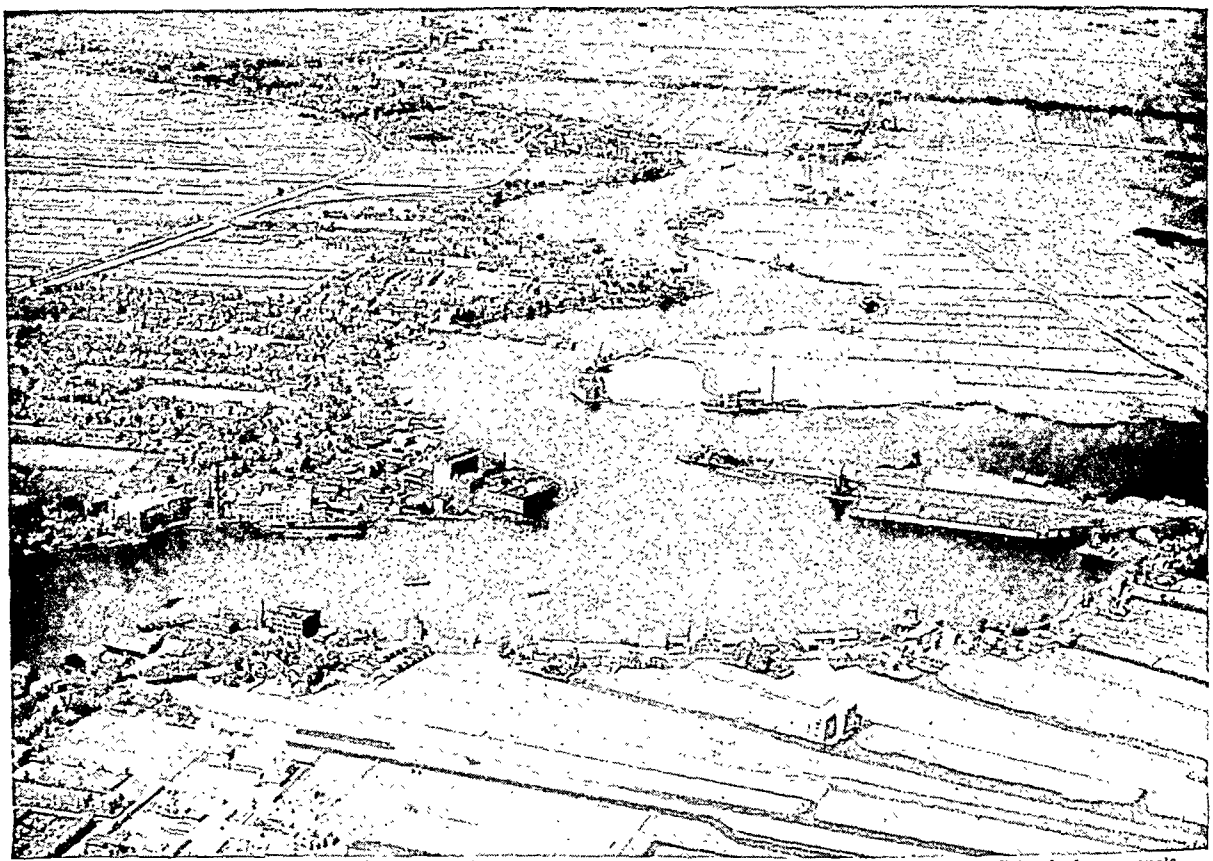
Diseased and Damaged Nerves

There are many causes of the improper functioning of nerves. For example, nerves may become inflamed and sore because of infection or inadequate diet. This condition is called *neuritis*. Malnutrition from any cause, ranging from poverty to alcoholism, can produce neuritis. When a person has neuritis, some or all of the nerves are sore, and it hurts to move or touch the skin over a nerve.

Nerves may also be physically damaged by accidents of various sorts. When a nerve is cut, the nerve fibers cannot send their messages across the disrupted portion. The result of such injury depends on what fibers are damaged. If they are motor fibers to a muscle, the muscle can no longer be moved; it is *paralyzed*. If they are sensory fibers (from an arm, for example) no sensations can be felt in the arm because sensory messages can no longer reach the brain. The arm is then said to be *anesthetic*. If the sensory fibers from the eye or ear are disrupted, blindness or deafness results. As long as such damage is restricted to the peripheral nerves, new fibers can grow in the old pathways. There may be no sensory or motor loss when regrowth is complete. Such *nerve regeneration*, however, does not take place in the spinal cord or brain; damage to these centers results in permanent loss of function.

In the past the nerves have mistakenly been held responsible for various ailments and complaints. A "nervous" person, for example, was thought to have something wrong with his nerves. We know now that nervousness results from situations in daily life rather than from disease of the nerves themselves, though disease may be a part of the life situation that produces nervousness. The more serious mental disturbance called *neurosis* was also blamed on the nerves, as the name indicates (*see* Brain). This is now known not to be the case.

The NATION *that* DROVE BACK *the* SEA



Seen from the air, the flat Dutch landscape shows an intricate pattern of innumerable fields marked off by drainage canals. This is a view across the drained area or polderland northwest of Amsterdam.

NETHERLANDS. For hundreds of years the sturdy, hard-working Dutch people have literally been building their little country, acre by acre and mile by mile, fighting back the tides and storms of the North Sea. This task of "keeping the dikes" has required unflagging courage and determination. It has also taken teamwork, for the Dutch soon found that only by working together could they succeed, not alone in reclaiming the land, but in building it into a fruitful and prosperous nation. This unity of purpose, aided by the fact that they are of one race with one language, has developed in them a strong national pride and independence.

Extent.—North to south, 210 miles; east to west, 120 miles. Land area, about 13,000 sq. mi. Population (1947 census), 9,625,499. Member of Netherlands-Indonesian Union, with Republic of Indonesia (once Dutch East Indies). Overseas territories: Surinam (Dutch Guiana); Netherlands West Indies. Area of overseas territories, about 55,000 sq. mi.; population (1949 est.), 368,914.

Natural Features.—Level surface, with almost all the coastal portion below sea level and protected by dikes and extensive drainage systems; mouths of Rhine, Maas (Meuse), and Scheldt rivers.

Products.—Butter, cheese, and milk; flower bulbs, rye, oats, potatoes, sugar beets, and wheat; herring and oysters; coal; cut diamonds, ships, textiles, flour, shoes, margarine, brick and tile, machinery, printed matter, cocoa, chocolate.

Cities. (1947 census).—Amsterdam (capital, 803,847), Rotterdam (646,248), The Hague (seat of government, 532,998), Utrecht (185,246), and Haarlem, Groningen, Eindhoven, Tilburg, Nijmegen, Enschede (over 100,000); Arnhem, Leyden, Breda (over 80,000).

(For map of Netherlands, *see* Belgium.)

The Struggle to Create New Land

Much of their land so patiently taken from the sea was flooded again during the second World War, when the Netherlands, or Holland, as the country is usually called, was conquered and occupied by the Germans. In the subsequent fighting, dikes and dams were destroyed, in part by Allied bombs and artillery but more extensively by the Germans when they were forced to retreat. Thousands of acres of land and many towns were ruined.

This country, which has made such a valiant struggle for its existence, covers about the same area as the two states of Connecticut and Massachusetts. It is tucked into a small corner of Europe, with the sea on the north and west, Germany on the east, and Belgium on the south. The two ends of its coast line are very ragged and deeply indented. The Frisian Islands form a low chain along the north coast, and in the southeast lies a group of delta islands, deposited by the principal rivers—the Rhine, Maas (or Meuse), and Scheldt—and their many tributaries.

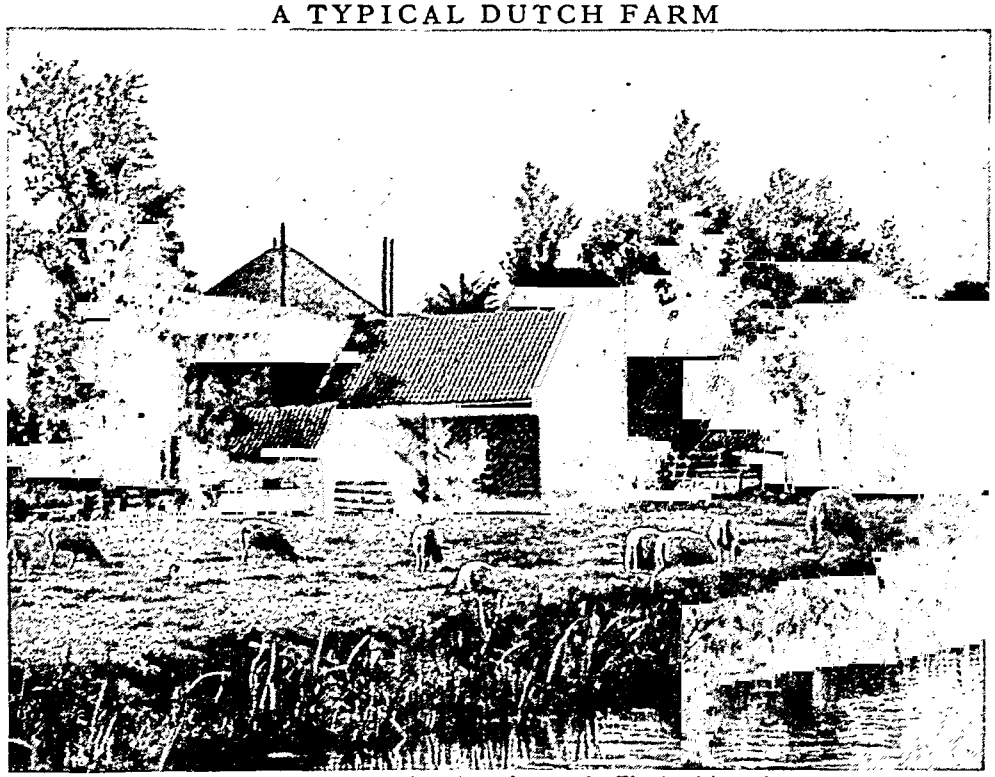
In the north, a large arm of the sea reaches almost halfway across the country. This body of water was once known as the Zuider Zee, but by a remarkable engineering feat the Dutch dammed the basin, and transformed it into a great inland lake, fed by one of the branches of the Rhine. Part of its bed was turned into dry land, and the surrounding waters were renamed Ijssel Lake. At the start of the

second World War, much of the land had been drained. After the war, European Recovery Program funds aided the project, which is part of a plan to add land to this most densely populated nation of Europe. There are about 825 persons to the square mile.

Except for the dunes along the coast, the only hills of any importance in the Netherlands are in the southern half of the province of Limburg—the thin tongue of Dutch territory wedged between Belgium and Germany. The eastern part is largely made up of long stretches of sandy soil, overgrown by heath and coarse grasses. The western provinces are mostly below sea level, and here are the richest farm lands and most fertile gardens. The flatness is relieved by the silvery network of canals.

The rescuing of land from the sea began with the efforts of the Dutch to control the tides that continually made the shallow rivers overflow their banks. Along the open coast, the sea itself had provided protection by piling up huge sand dunes, but the tidal overflow from the rivers came in behind these

A TYPICAL DUTCH FARM



The house is built of stone and tile on the edge of a canal. The land is so low that the fields are moors, but the sturdy sheep manage to thrive on the coarse grasses.

CANALS THREAD THE LEVEL DUTCH COUNTRYSIDE



Canals carry most of the trade in the Netherlands. Here a boatman poles a lighter, loaded with potted flowers, to market. The boy's small boat is pushing aside a *pivot* bridge that links the neat residence, left, with the hedge-lined street.

OLD ROTTERDAM BEFORE WAR SWEPT OVER IT



The heart of Rotterdam looked like this before German planes bombed about two square miles of it into ruins in 1940. Among the few buildings that remained was the 15th-century Groote Kerk ("great church"), which rises in the background. Standing at the mouth of the Rhine, Rotterdam is a great port. Canals wind among and under its streets.

dunes and turned the land into salt marshes. So the people first built dikes along the river banks to hold back the water. When the water could not be held back, it was channeled into canals, and these too were flanked by dikes. In earlier days the sea would break through the coastal dunes and flood towns and farms, and drown thousands of people. Most of the sea walls are now concrete, some of them wide enough to carry railroads and highways. They withstand the angry storms much more efficiently, but still require constant care and vigilance. The river dikes are usually built of clay, and have wiry grasses and scrubby trees planted along the tops. Their roots hold the clay together and strengthen it. The rise and fall of the tides in the rivers are now controlled by dams, sluices, and locks.

After the dikes were built, the rich soil deposited by the water had to be drained to form the *polders*, as the reclaimed areas are called. So the ingenious Dutch started a series of connecting ditches that have grown into a network of smaller canals that cross and recross the entire country. Thousands of windmills were put up and the strong wind from the sea furnished the power for pumping the water out of the polders into the drainage canals. Many of the windmills are still used, although much of the pumping is now done by electricity, steam, and gasoline.

WOODEN SHOES AND STURDY GARB



Various Dutch districts have traditional holiday caps for women and girls. These youngsters wear the "ear bonnets" of Volendam, near Amsterdam.

A Damp but Moderate Climate

The climate of the Netherlands is generally damp, with about 200 days of the year that are more or less rainy or foggy. Yet the total rainfall is not excessive—about 28 inches annually. While the weather is changeable, it does not run to extremes of heat and cold. Winter temperatures are moderated by the southwest winds that prevail from September to March, and the summer heat in turn is moderated by sea breezes from the northwest. The canals and rivers in the western half of the country are likely to remain open most of the winter, those in the eastern half usually freeze over.

More Waterways than Highways

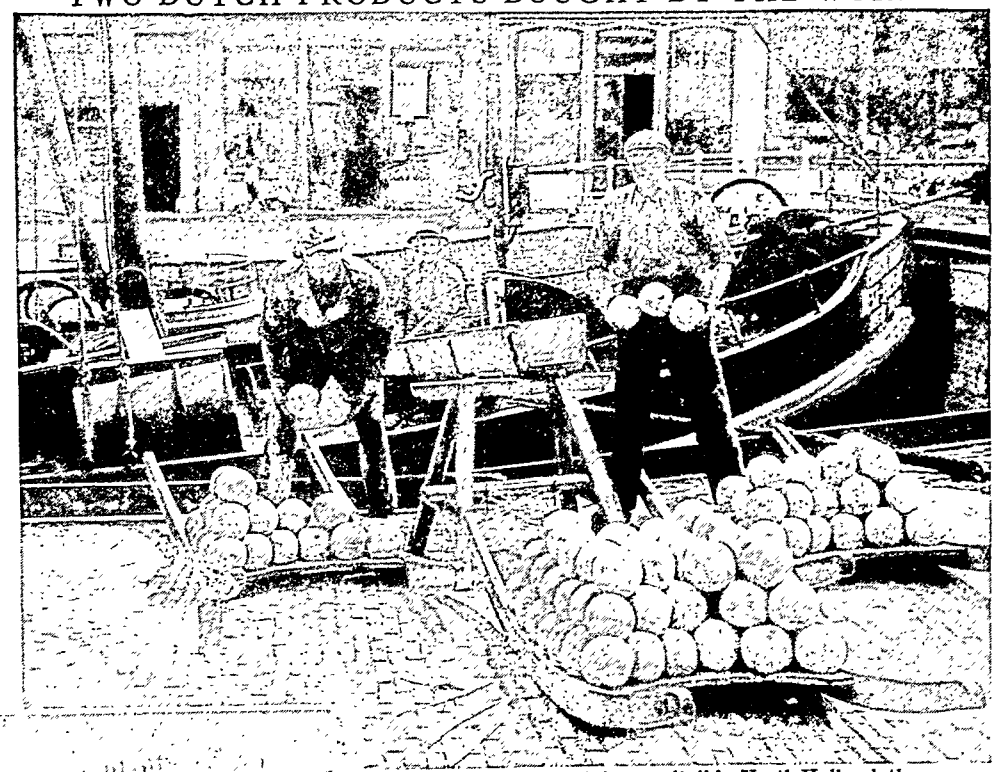
The canals and rivers are used by the Dutch as we use our streets and highways. In fact, they have about 4,500 miles of navigable waterways, and only about 3,000 miles of roads. The roads, except in some of the larger cities, are built of bricks, and are narrow and crowded.

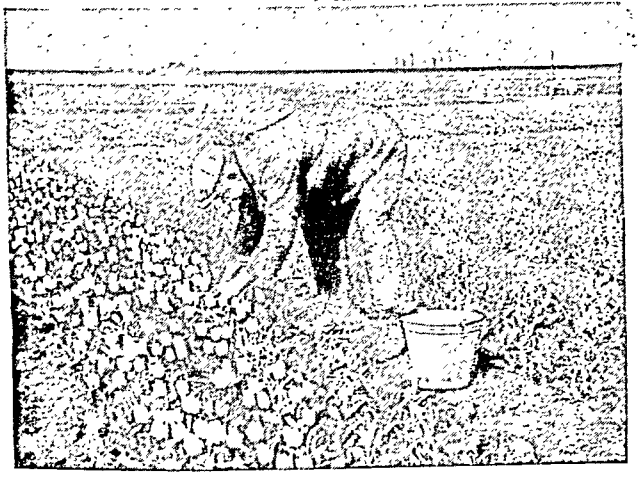
There are comparatively few privately owned automobiles, but thousands of bicycles, which are

popular because they do not require gasoline to run them, and gasoline is scarce and expensive in the Netherlands. There are many busses, and even a few vegetable carts drawn by dogs, although these quaint vehicles are not so common a sight as they were a few years ago. Holland has many miles of tramways, somewhat more than its 2,300 miles of railway lines. But most of its freight is carried on the canals which crisscross many of the big cities as well as the countryside.

These waterways not only connect all Holland, but give it access

TWO DUTCH PRODUCTS BOUGHT BY THE WORLD





Here at Alkmaar, the "cheese city" in North Holland, these men are loading balls of Edam cheese for export from Amsterdam. They roll the cheeses from the rocker handbarrows down the trough into the boat. In the lower picture, a flower grower picks tulips for market. Many blooms go by airplane to cities throughout Europe. Tons of bulbs are shipped to America.

to the neighboring countries of Belgium and Germany. Great, flat barges loaded down with merchandise poke up and down, helping to carry on the country's trade. Passenger boats of all types scurry about, taking people on their errands of business or pleasure.

Commerce and Industries

Its favorable location on the sea and its easy access to neighboring countries, together with the industry and good management of the people, combined to make the Netherlands one of the most important trading nations of the world. To carry the rich products from its huge colonies in the East Indies and from Surinam (Dutch Guiana) in South America, the nation built one of the largest merchant fleets afloat. This made it an influential factor in international relations before the second World War. Among the most important colonial exports were sugar, rubber, oil, tobacco, and spices.

For several centuries fisheries were among the most important Dutch industries, with fresh and salted herring the chief source of revenue. This industry has been greatly reduced in the last two centuries by wars and competition from more favorably situated countries. But there are still many fishing villages on the islands and along the coast, and it is there that the customs and quaint dress of old-time Holland have persisted the longest.

For years the Dutch had to import all fuel for their factories and cut peat to heat their homes. Then discovery of coal in Limburg province made them partly self-sufficient. The government operates most of the coal mines. After the second World War petroleum was discovered at Schoonebeek near the German border. The wells pump an increasing supply of oil.

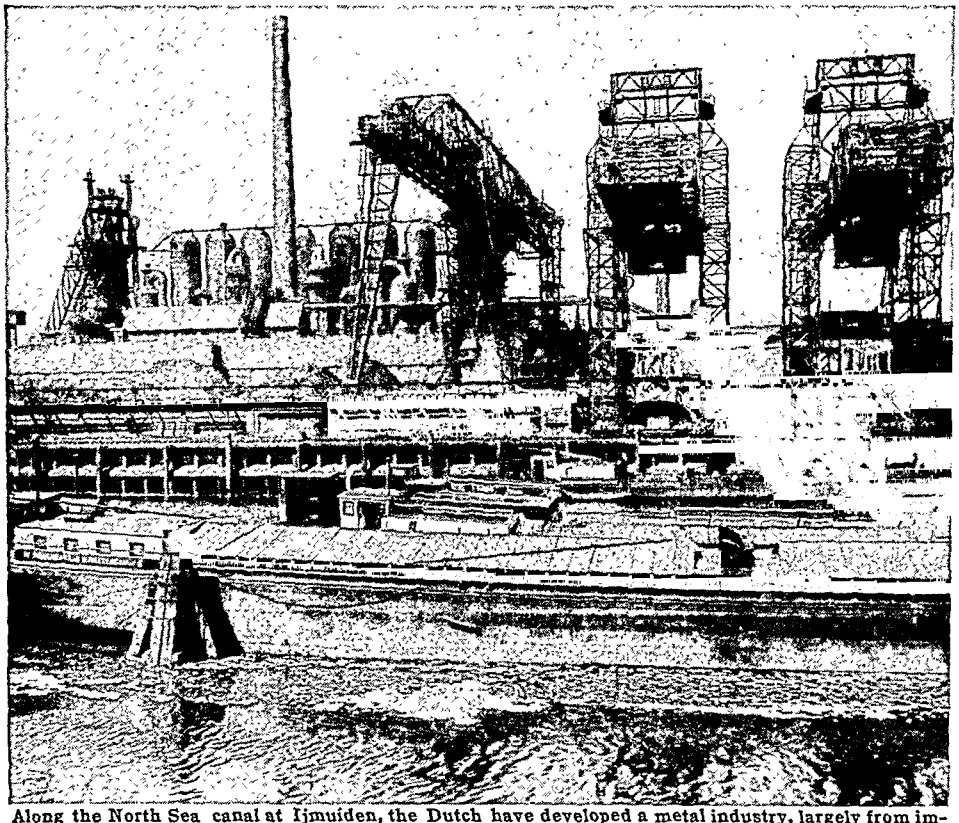
The country is highly industrialized. Textiles, ships, electrical equipment, machinery, tools, shoes, rubber goods, and foods are among the important products. Tile, brick, and pottery are made from the abundant clay, but many raw materials are imported.

How the People Live

Thriving industry and commerce have attracted most of the Dutch to the cities. But about one-sixth of the working people make a living farming the crowded, hard-won land. Using scientific methods, they raise larger crops to the acre than most farmers.

They take excellent care of the dairy cows, keeping them scrubbed and spotless. The brick barns are usually lined with tile and are equipped with the latest improvements that the dairy industry and government experiments can offer. On some of the older

A MODERN STEEL PLANT LOOMS ABOVE THE CANAL



Along the North Sea canal at Ijmuiden, the Dutch have developed a metal industry, largely from imported raw materials. At the steel plant above, barges have brought iron ore and coking coal to be unloaded by the giant trellis-like cranes in the background. The Dutch export considerable quantities of finished metal. Other major industries include shipbuilding and the manufacture of radios and brick. Developed largely since the first World War, industry employs over a third of the Dutch.

farms, the barn is actually part of the house, and is as well cared for as the living quarters. The herds graze on the higher land that is not sufficiently fertile for farming or on some of the polders that cannot be drained dry enough for raising crops. Holland's cheeses have a world-wide reputation, especially the two that are named for cities—the bright red, round Edam and the Gouda.

Where the land is fertile, virtually every inch is utilized in raising grains, vegetables, or flowers. The amount produced on these small farms, which average about two acres, is amazing, but it is not nearly enough to feed the whole population, and much of their food has to be imported. Rye is the largest of the grain crops, but the Dutch farmer also grows oats, barley, flax, sugar beets, and potatoes.

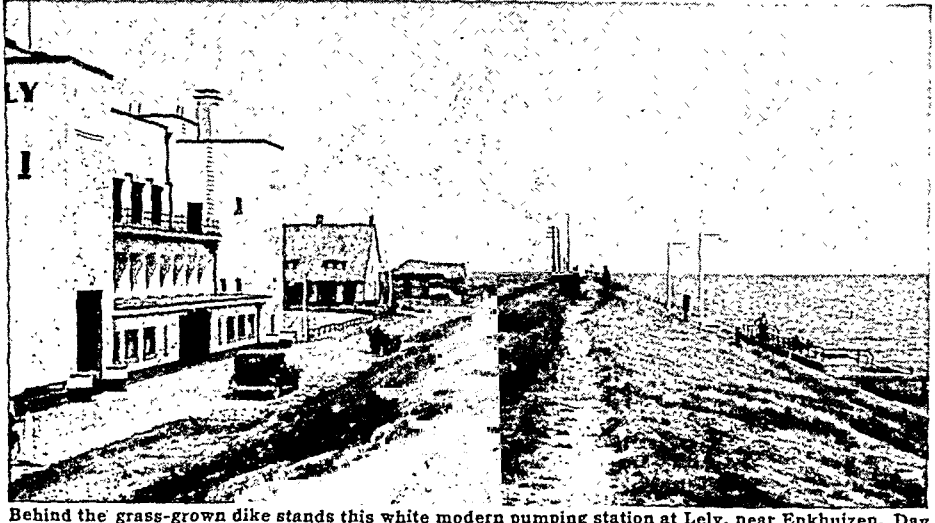
For over three hundred years the Dutch have been experimenting with fine varieties of tulip, hyacinth, daffodil, iris, and gladiolus bulbs, which flourish in the mild, moist climate. They ship bulbs all over the world and send flowers to European cities. Sales may amount to 30 million dollars or more in a year.

Houses and Family Life

Since land is scarce and valuable, the farmers' houses are usually small and city people live in apartments. Steep tile roofs drain off the rain, and walls are of brick, as wood is very scarce. They are often gaily painted, and the roofs tiled in lively colors or picturesquely thatched. There is always a trim, carefully tended little garden, with rows of plants so neat and straight they scarcely look real. Those that stand on a canal may face a pretty rustic bridge, with a boat, instead of an automobile, parked near by.

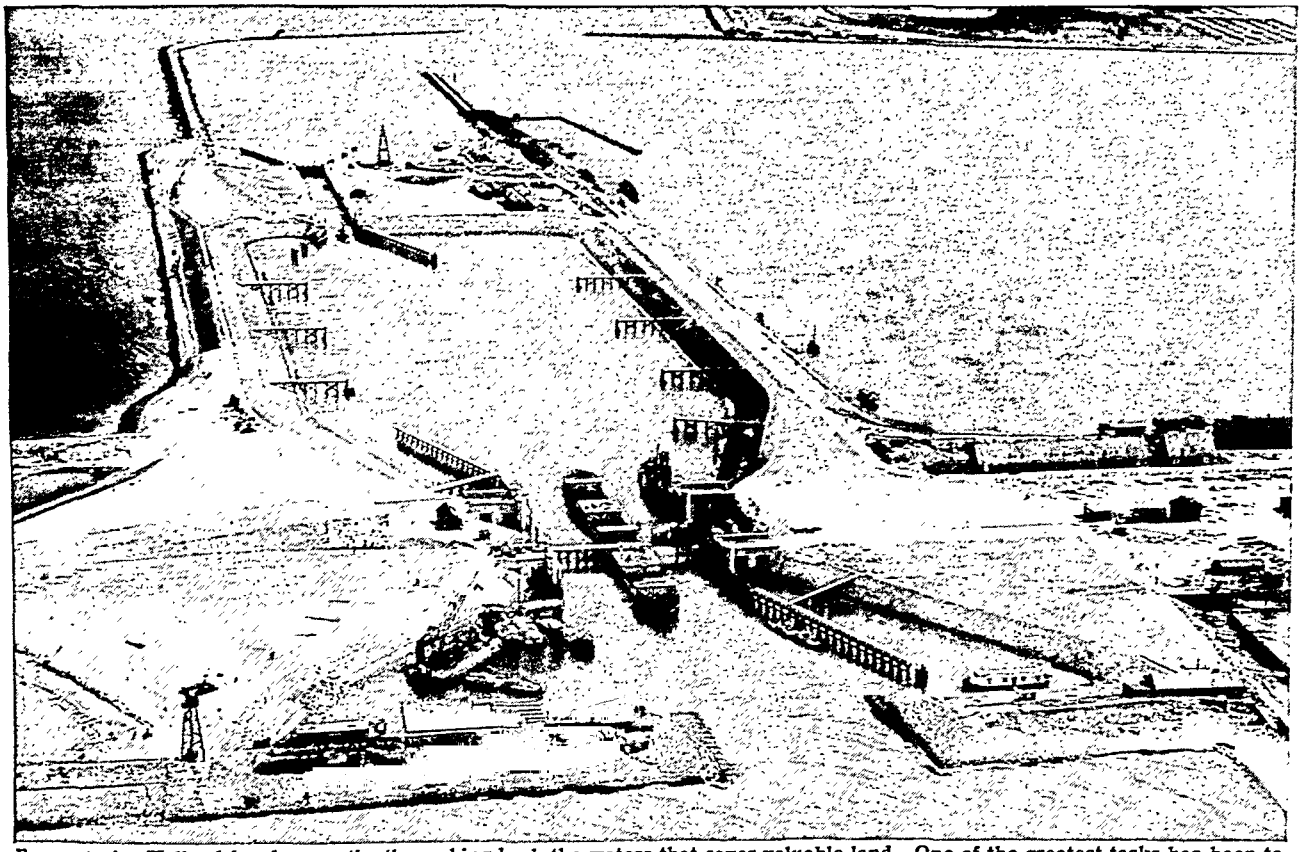
At the door when the family is at home lies a row of large and small wooden shoes, for

PUMPING BACK THE ZUIDER ZEE TO MAKE LAND



Behind the grass-grown dike stands this white modern pumping station at Lely, near Enkhuizen. Day and night its turbines drive back the seeping waters of the Zuider Zee (Ijssel Lake), at right.

HOLLAND CONTINUES ITS STRUGGLE AGAINST THE SEA



For centuries Holland has been patiently pushing back the waters that cover valuable land. One of the greatest tasks has been to drain the Zuider Zee, an immense flood which swept inland more than five hundred years ago. Now with the aid of modern machinery, the end of this long battle is in sight. Here is a view of a part of the great project begun in 1920 to reclaim 550,000 acres of rich farming land. The plan was conceived by C. Lely, a young engineer who became minister of public works.

the thrifty Dutch know that leather shoes would have a very short life in their damp fields. Indoors the shining copper pots reflect a warm glow from their polished sides, the tiled floors gleam, and the linens and cottons are snowy white. The Dutch housewife is as capable in her home as her husband is in outside affairs. Every member of the family who is old enough has his responsibilities and takes them seriously. This is the national tradition.

When the canals freeze over, and the ice is thick enough to be safe, it is not unusual to see all the members of the family putting on their skates, and gliding away over the canals to call on friends or make a holiday in a near-by city. Stores and schools close, for skating is the most beloved sport of the Netherlands. Children are taught when they are four years old, and grandfather and grandmother too join in the fun.

Except for their first skating days and the Christmas and the Saint Nicholas celebrations, the Dutch children have very few holidays to keep them away from school (*see also* Christmas).

REMINDERS OF OLD DAYS



Seated on the turfed dike, a sturdy grandfather tells how windmills help to keep back the sea.

The Character of the Cities

The Dutch cities are an interesting combination of old and new, but the older buildings are usually well-kept and repaired. Modern architecture of the most practical type is in general use for factories and office buildings. Some are built of glass, but the majority are of varicolored brick.

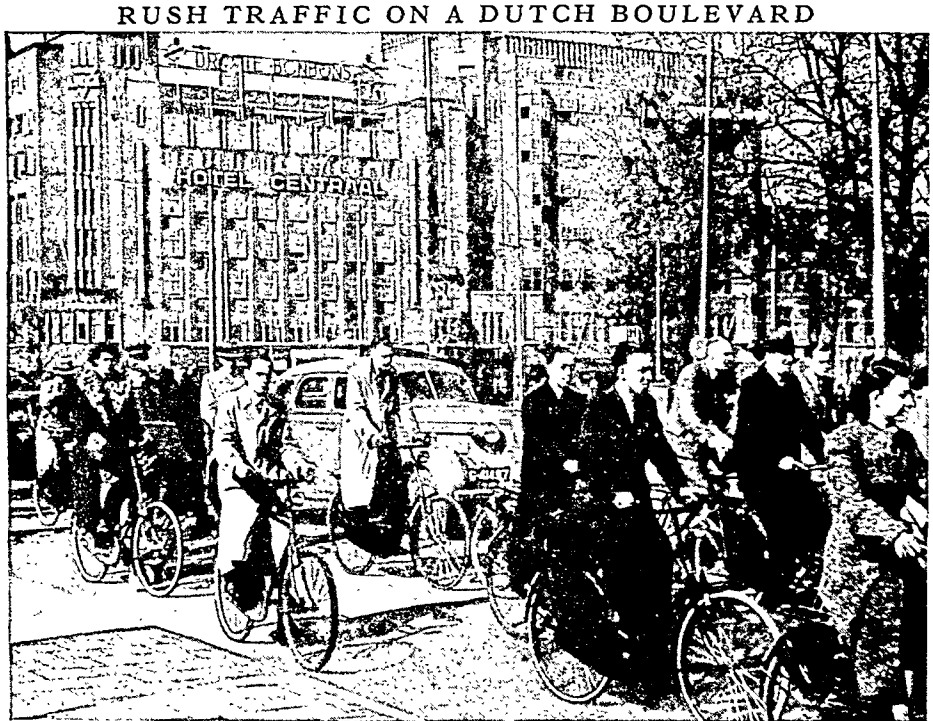
City dwellings are modern for the most part, but every now and then an old house that has weathered storms and wars for hundreds of years lends a pleasing contrast to the scene. Some of the houses in the Low Country are built on piles, as the ground is not solid enough for ordinary foundations.

The government of the Netherlands is much interested in large-scale housing projects and has erected many of them in and near the bigger cities.

Slum districts and abject poverty were virtually unknown in the years before the second World War.

Among the most picturesque examples of historic architecture are the old town halls, the market buildings, and the weighing stations for cheese, where the farmers bring their wares on market days. Almost every product of the country's soil and labor comes to these busy centers. Some of the Lowlanders still wear their native costumes on market days, the women in their wide, billowing skirts, and tight fitting little caps with flaring "ears," and the men in their full-topped trousers and little round hats. But in most parts of the country the colorful peasant costumes are disappearing.

RUSH TRAFFIC ON A DUTCH BOULEVARD



The whir and gleam of bicycles herald the "rush hour" in Dutch cities. As gasoline is expensive the Dutch use few automobiles. Men and women pedal to work on inspected, registered cycles.

While the transportation system has made it possible for the cities of the Netherlands to be scattered throughout the country, the five largest ones are clustered in the area between the delta islands and Ijssel Lake. Here are Amsterdam, the capital and financial center; Rotterdam, the largest seaport; The Hague, which is the seat of the government and the former meeting place of the World Court; Utrecht, with its many spires and bridges, famous as a center of art and education; and Haarlem, the colorful heart of the flower and bulb industry. Within a distance of 40 miles from Rotterdam by canal are Delft, once famous for the lovely pottery and tiles made there, and Leyden, which William the Silent rewarded for its bravery under the Spanish siege of 1574.

Education and Art

The standards of education in the Netherlands are among the highest in the world, and illiteracy is almost unknown. In the higher grades and high school years, the children study English, French, and German, in addition to the usual subjects. The universities in Groningen, Amsterdam, Utrecht, and Leyden have flourished since the 17th century, and have always been noted for their progressive scholarship The Royal Polytechnic School is at Delft.

There are many fine art galleries in both the large and small cities of the Netherlands. They reflect the proud history of Dutch art. Rembrandt was a product of the "Golden Age" of the Netherlands and many of his finest paintings remain. Frans Hals was of the same period, and most of his canvases are in the museum at Haarlem, where he lived and died. The tranquil charms of the Dutch landscape inspired Van Goyen, the Ruysdaels, and Hobbema. Jan Steen and Jan Vermeer painted interior scenes, depicting the Dutch homes and life of their time. Pastoral scenes and farm life were immortalized by Israels and Paul Potter. The outstanding modern Dutch painter was the unhappy Van Gogh. (*See also* Painting.)

Dutch writers are not so well known, owing in part to the difficulties of the language, but out of the past the names of some great scholars survive, such as Erasmus the humanist, Grotius the famous jurist, and Spinoza the philosopher.

Early History of the Netherlands

During the Middle Ages the Low Countries, comprising the two countries now known as Belgium and Holland, were divided into small states, duchies, and counties, each separately ruled and each constantly at war with its neighbors.

The powerful Burgundian duke, Philip the Bold, finally got control of them in 1384, and he and his successors consolidated the states into a strong unit. When Charles the Bold of Burgundy was killed, in 1477, his only child, a daughter, inherited the dukedom. She married Maximilian of Austria, a member of the great Hapsburg family, and for many years thereafter the Hapsburgs controlled the Low Countries.

In 1555, when the Hapsburg emperor, Charles V, abdicated, Philip II of Spain became ruler of the Netherlands. He was born in Spain, and scorned the Low Countries, never even troubling to learn their language. The Protestant Reformation had gained many adherents there by that time, and he determined to stamp them out. He sent the Duke of Alva with an

army to crush the Reformists. His persecutions reached their climax in the terrible Council of Blood. Thousands fled to Germany and England to escape torture and death.

Armed revolts were quickly quelled until in 1568 the rebels won help from William the Silent, Prince of Orange, who was German born but had possessions in the Netherlands (*see* William the Silent). His fleet of privateers (Beggars of the Sea) sank many Spanish ships, captured the cities at the mouth of the Maas and the Scheldt rivers, and drove the Spaniards out of that part of the country. In 1579 the Protestant states formed the Union of Utrecht (thenceforth called the United Provinces, or Dutch Netherlands), and declared themselves independent in 1581. For helping to achieve this unity, William was called the "father of his country." The Low Countries to the south remained Catholic and still belonged to Spain (*see* Belgium). After a struggle led by William's successor, Jan van Olden Barneveldt, and by William's son, Prince Maurice, the United Provinces forced Spain in 1609 to sign a truce that virtually recognized their independence. Formal recognition was delayed until the Treaty of Münster in 1648.

AFTER NAZIS LET IN THE SEA



A German sentry scans Dutch farmland flooded and ruined when the Nazi army opened the dikes to slow the advance of the Allied invaders.

In the first half of the 17th century, the United Provinces grew in wealth and power. They possessed the largest merchant fleet in the world, and they started to acquire the rich colonies which ultimately made the Dutch one of the world's colonial powers (*see* East Indies). England had yet to build up its manufacturing trade, Germany was at war, and Spain was fast declining; so the Dutch rapidly became a leading power. This was indeed the "Golden Age" for the Netherlands in wealth, art, and commerce.

War with Its Neighbors

Meanwhile the anti-Orangists had ousted the House of Orange, and in 1653 had made Jan de Witt, one of the greatest statesmen of the time, Pensionary of Holland. His first task was to fight the English who had begun to realize that they had a serious rival on the sea and who had started a naval war in 1652. The fighting was in two periods (1652–54 and 1665–67). In the first period, memorable engagements were fought between the Dutch admiral, Martin H. Tromp, and the English admiral, Robert Blake (*see* Blake). In the second period, the Dutch admiral Michael A. de Ruyter sailed up the Thames and bombarded London in 1667. But while De Witt was building up a navy he neglected the land force, and King Louis XIV of France promptly invaded the Netherlands. In this desperate situation, the Dutch recalled young Prince William III of Orange. He took command of the army and drove out the French. This prince was a born strategist and a devoted patriot. He brought about peace with England in 1674 and with France in 1678. In 1677 he had married Mary, daughter of King James II of England, and later became king of England as William III when James was dethroned (*see* William, Kings of England).

Under the Temporary Rule of France

After the death of William in 1702, the United Provinces declined. In 1747 the office of *stadholder*, or governor, was made hereditary to the House of Orange. The people were dissatisfied with their ruler, William V, and helped the French Revolutionary armies that invaded the provinces in 1797. The French overthrew the House of Orange, and made the country a republic. When Napoleon became emperor, however, he made the Low Countries part of his empire.

JULIANA, WILHELMINA, AND BERNHARD



Wilhelmina, Queen of the Netherlands for 50 years, reads one of her last addresses from the throne. In 1948 she abdicated in favor of Juliana.

After Napoleon's defeat, the Congress of Vienna reinstated the House of Orange and tried to make one nation of the northern and southern Low Countries. The Prince of Orange was crowned King William I in 1815. Fifteen years later the southern provinces rebelled and set up the new kingdom of Belgium (*see* Belgium). From kings William II and III of Orange, the people of the Netherlands now demanded many rights of self-

government. As a result, the Netherlands became a true constitutional monarchy, with an elected parliament to make its laws.

William III ruled from 1849 to 1890 and was succeeded by his daughter, Wilhelmina. Her only child, Crown Princess Juliana, married the German Prince Bernhard zu Lippe-Biesterfeld in 1937.

The Netherlands and the World Wars

During the first World War, the Dutch succeeded in remaining neutral, although they lost their foreign trade and suffered from food shortages. But on May 10, 1940, the Germans attacked them without warning, landing paratroopers and bombing the cities. The Nazi fifth column movement paralyzed resistance, and the Netherlands surrendered in five days. Queen Wilhelmina, with the rest of the royal family and the cabinet, escaped and set up a government in London.

The Nazis all but starved the people and carried many away to slave labor camps in Germany. The Dutch Underground resisted stubbornly by sabotage and reprisals. Some vessels of the Dutch navy escaped and helped to patrol the Allied supply lines. In 1942 Japan seized the Netherlands rich tropical island empire of the East Indies.

The liberation of the Netherlands began in September 1944 when the Allies drove the Nazis from the southern borders. Nazi forces held the lower Rhine until May 4, 1945, cutting dikes to slow the Allied advance. The sea water ruined vast tracts of Dutch farmland. (*See also* World War, Second.)

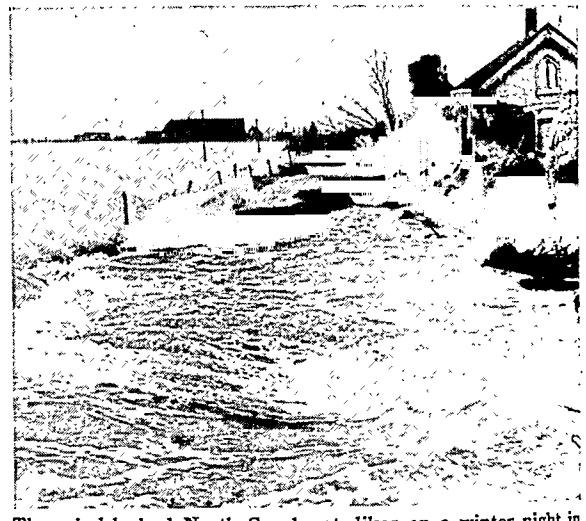
Wilhelmina returned to the throne. The Dutch quickly restored their battered cities and flooded lands; but they lost control of much of their East Indies empire in Indonesian revolts in 1945–48. In 1948 Queen Wilhelmina abdicated in favor of Juliana.

In 1949 the Netherlands recognized the East Indies as an independent nation, which became the Republic of Indonesia in 1950 (*see* East Indies; Indonesia). The Indonesians and Dutch formed a Netherlands-Indonesian Union. At home, the Dutch government began an industrialization program to help employ the fast-growing population. The Dutch also contributed to NATO for the defense of Europe and sent combat troops to the United Nations forces in Korea. In 1952 Queen Juliana and Prince Bernhard visited the United States, where Juliana addressed Congress.

On the night of January 31-February 1, 1953, disaster struck the Netherlands. Its old enemy the sea, driven at high tide by a hurricane, smashed through the dikes at some 150 places in the southwest and even poured up the Maas estuary. The North Sea flooded about 1,000 square miles and took over 1,500 lives. The Dutch determinedly drained their flooded lands and removed the salt from the fields. They had given up American economic aid, but the flood damage forced them to get a renewal for 1953. The government, in 1954, planned giant new dams and sea walls.

In 1954 the Netherlands became the first nation to ratify the European Defense Community. Turning aside Russian protests, the Netherlands also assigned Dutch fields to American Air Force units of NATO.

NORTH SEA FURY STRIKES HOLLAND



The wind-lashed North Sea burst dikes on a winter night in 1953, flooding lands the Dutch had worked 700 years to make.



Several persons and nearly all livestock drowned in this village. National damage was estimated at over 250 million dollars.



While the flood presses near, civilians and Dutch soldiers struggle to brace the dikes with timber, bricks, and sandbags, stacked in layers. American planes brought in material.

REFERENCE-OUTLINE FOR THE NETHERLANDS AND BELGIUM

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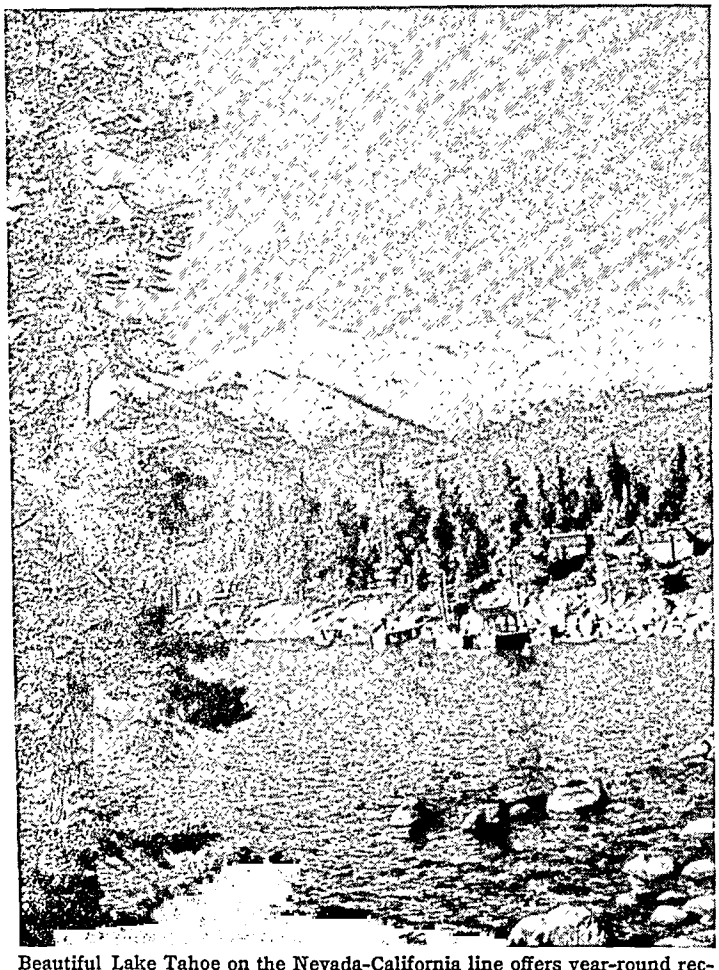
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Rugged NEVADA, RICH *in* TREASURE



Beautiful Lake Tahoe on the Nevada-California line offers year-round recreation. Beyond its rocky shore rise evergreen forests and the Sierras.

NEVADA. The sixth largest state in the Union has the fewest people of any state. Nevada's entire population of 160,083 is smaller than that of about 60 cities in the United States. Nevada is beautiful, with majestic mountains, the play of light over salt deserts, and the brilliant colors of bare rock and sand dunes. Mountains have such distinctive names as Opal, Rainbow, Ruby, and Blue for their marked coloring. But the dry soil supports only sagebrush and other desert plants. Hence Nevada is called the "Sagebrush State."

Nevada is dry because the lofty Sierra Nevada rises along the western border and cuts off the rain-bearing winds from the Pacific Ocean. The average precipitation in a year is only about nine inches. Much of it falls as snow in the winter months. Snowy caps on the mountains give the state its name—in Spanish, Nevada means "snow-covered."

Basins and Landlocked Lakes

Most of Nevada lies in the Great Basin of the western United States. This is a great mountain-rimmed depression. Many of the rivers flow from the mountains into the basin. There the water may form a lake or may sink into the ground or evaporate. Only the northeastern and southeastern corners have rivers that drain outward to the Pacific Ocean.

The surface of the state is broken by many mountain ranges. Some valleys between the ranges contain salt lakes. Others are great salt-encrusted depressions called *sinks*. The salt was brought by the rivers, and it was left when the water evaporated.

Along the rivers are meadows which provide pasturage for livestock. The longest river is the Humboldt, which flows from east to west across the northern part of the state. It provided water for the covered wagon trains that brought settlers to California in the days before the railroads. In spring, melting snow makes water abundant, and many regions blaze with the blossoms of creosote, cactus, sagebrush, wild iris, and wild peach.

Nevada's most important natural lakes are Winnemucca, Carson, Pyramid, and Walker. They are remnants of Lake Lahontan, which covered more than 8,000 square miles in Ice Age times. On the Colorado River, Hoover Dam creates Lake Mead and Davis Dam forms Lake Mohave.

Agriculture and Irrigation

The United States government holds more than 85 per cent of all Nevada in national forests, grazing lands, and game preserves. Less than 10 million acres are privately owned. Cattle and sheep raising are the main agricultural industries.

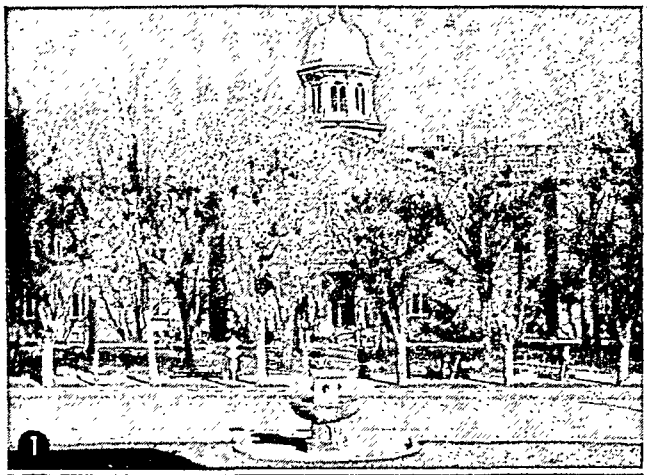
Such crops as are raised depend upon irrigation. Nevada shares in the waters of the Colorado River impounded by Hoover Dam, but the region has little fertile land. The largest projects are in the west, which gets water from melting snows. The Newlands Reclamation Project, around Fallon, uses the waters of the Truckee and Carson rivers, impounded in the Lahontan Reservoir. The Rye Patch Dam, near Lovelock, retains the flood waters of the Humboldt River. The Walker River valley is also irrigated. Alfalfa, wheat, barley, oats, fruits, and vegetables are produced in these regions.

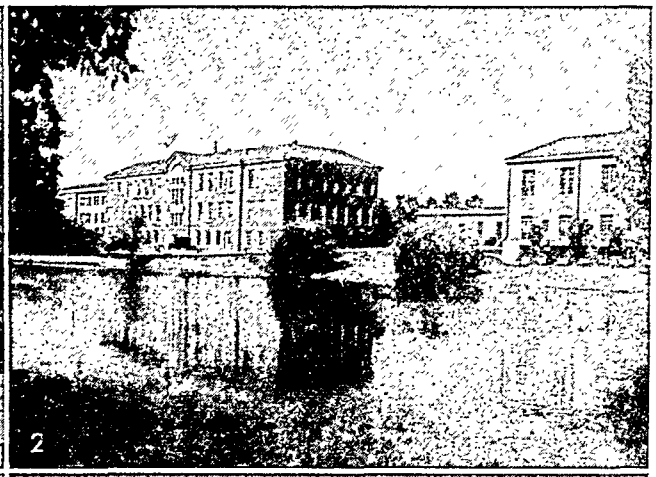
Many bird and game refuges have been set aside. Typical desert shrubs grow in the valleys—largely sagebrush in the north and creosote bush in the south. The forests are mainly on mountain slopes and foothills. They are primarily piñon and juniper, with pine, fir, and hemlock on the higher levels.

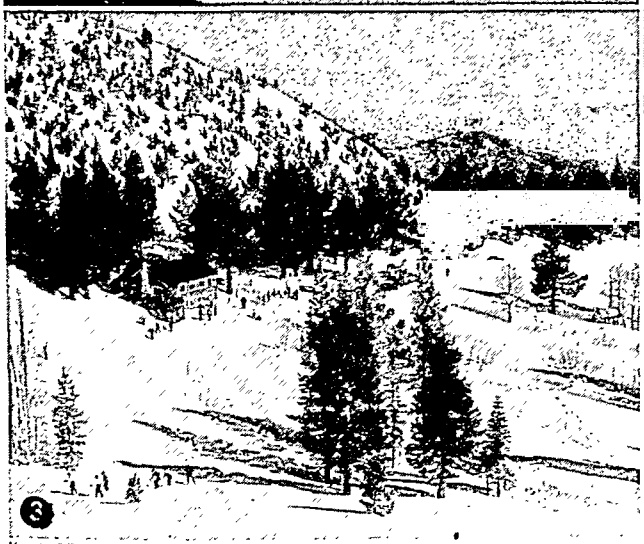
Industries and Cities

An important part of Nevada's wealth comes from minerals. Although it is the 48th state in population, it ranks about 30th in the value of its minerals. The most valuable is copper, mined chiefly in the Ely district. The state also produces important quantities of zinc, gold, sand and gravel, lead, and tung-

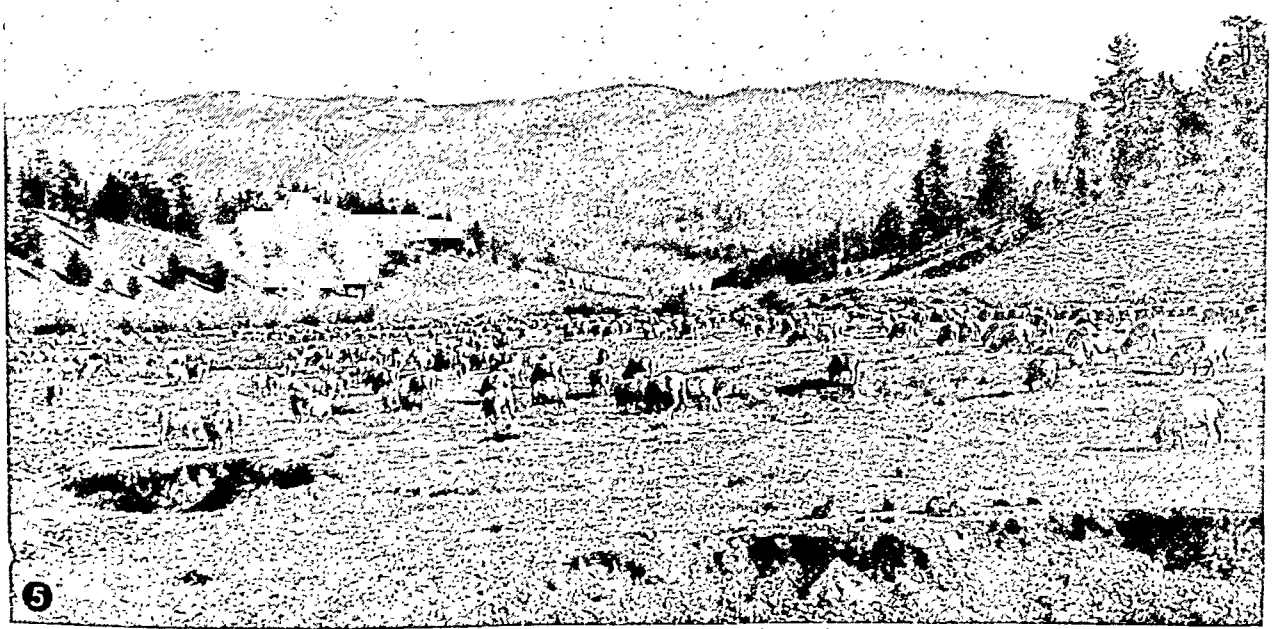
SCENES FROM NEVADA'S BROAD EXPANSE











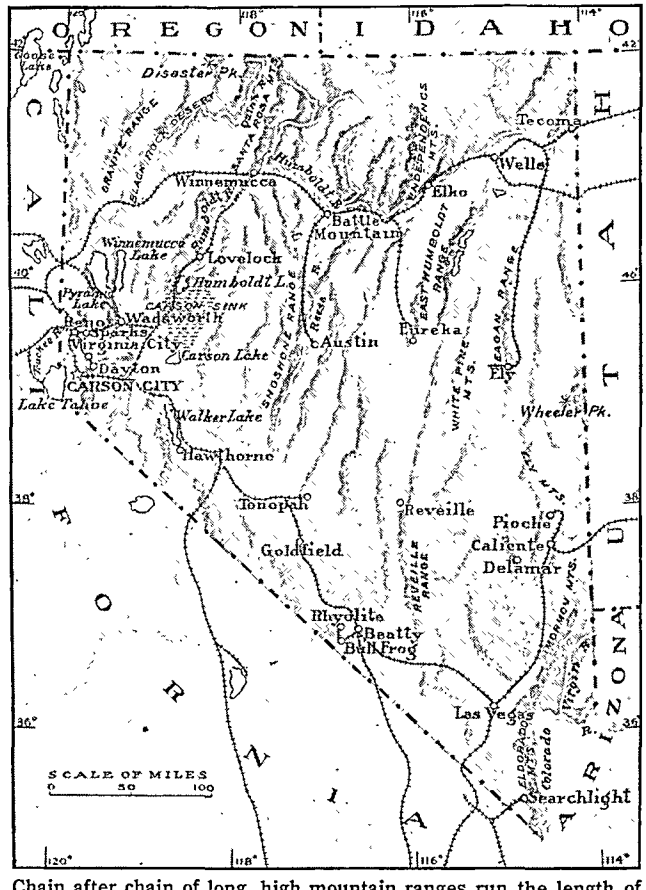
1. The dome of Nevada's capitol gleams above the elms planted by early settlers. The building, begun in 1870, stands in Carson City. 2. Neo-colonial buildings of the University of Nevada are mirrored in Manzanita Lake at Reno. 3. The sheltered "bowl" on Mount Rose near Lake Tahoe provides popular ski runs. 4. Cyanidation plants like this one make the mining of low-grade gold ore profitable. 5. Like most of Nevada's flocks, these sheep graze on public land.

sten. Other important minerals are silver, stone, barite, talc and pinite, manganiferous ore, gypsum, iron ore, mercury, and sulfur ore. In World War II deposits of magnesium and manganese helped to make the United States independent of foreign supplies of these strategic minerals.

Metal refining is one of Nevada's important industries. Much of the mined copper is refined within the state, and the metals are shipped elsewhere for manufacturing. Other industries are meat packing and the manufacture of chemicals, and concrete and plaster products.

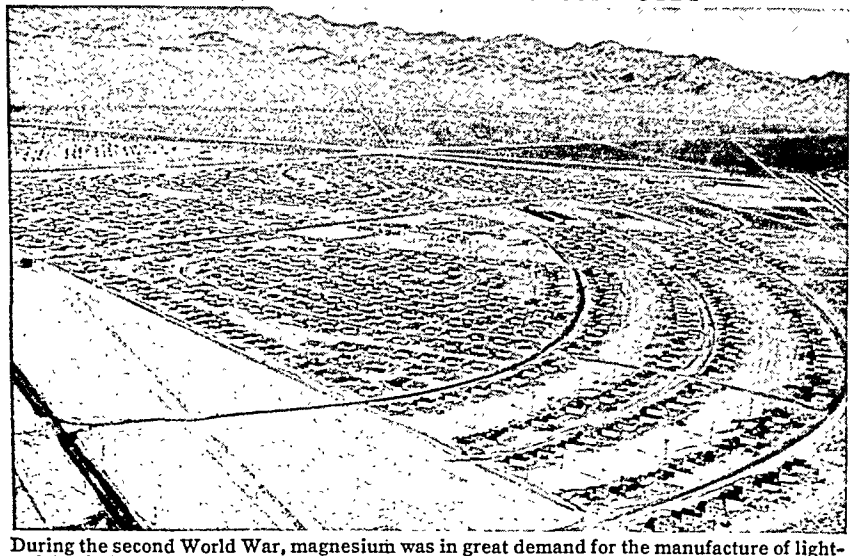
Reno, in the western part of the state, is the largest city and the chief banking, shopping, and distributing center. It is the seat of the state university. Las Vegas, in the southeastern corner, is a popular tourist resort, because it is near Lake Mead and Hoover Dam. The state capital is at Carson City. It is near Lake Tahoe, a noted resort area which is shared with California (*see* Carson City).

NEVADA MEANS "SNOW-COVERED"



Chain after chain of long, high mountain ranges run the length of the state north and south. Between them are flat valleys. The higher Sierra Nevada extend from California into western Nevada.

THE TOWN THAT MAGNESIUM BUILT



During the second World War, magnesium was in great demand for the manufacture of lightweight airplane parts and fire bombs. To provide workers for the refining plant at Henderson, the government built more than 1,000 homes, as shown above.

Nevada has about 5,000 Indians. They belong to the Piute and Shoshone and other tribes of the old Shoshonean stock. Most of them live on Indian reservations. The largest are Pyramid Lake, Walker River, and Duck Valley, which is partly in Idaho.

History of Nevada

The first white man to cross what is now Nevada was probably Francisco Garcés, a Franciscan friar, in 1775. Between 1825 and 1843 several trappers, fur traders, and explorers crossed the area. The first permanent settlement was made in 1849, when the Mormons established a trading post near Genoa.

The discovery of gold and silver in the Comstock Lode in 1859 brought a rush of fortune-seekers into the Carson River valley, and Virginia City became a busy mining town. Many newcomers were miners from exhausted gold placer mines in California. The Comstock Lode proved to have ore deposits which were among the richest in the world. Over the years it yielded gold worth 400 million dollars and silver worth even more. After 1877 the Comstock Lode began to give out. Mining declined until the discovery, in the 20th century, of new fields at Tonopah, Goldfield, and other places.

Nevada was in the territory ceded by Mexico after the Mexican War in 1848. The Territory of Utah, created in 1850, included most of Nevada. In 1864 Nevada became a state. It had few people, but President Lincoln sought its admittance for its pro-Union sentiment.

Since 1951 atomic tests have been made at Yucca Flat and Frenchman's Flats. (*See also* chronology in Nevada Fact Summary; United States, section "Western Basins and Plateaus.")

Nevada Fact Summary

NEVADA (Nev.): True origin of name is uncertain. In Spanish, *nevada* means "snow-covered," suggesting the Sierra Nevada (mountains).

Nickname: "Sagebrush State," for its abundant growth of wild sage. Also, "Silver State," in tribute to one of its major industries, silver mining.

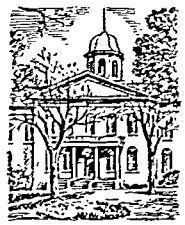
Seal: State scene includes plow, mill, tunnel into mine, railroad cars crossing mountain gorge, and rising sun; motto and 36 stars surround the scene.

Motto: All for Our Country.

Flag: For description and illustration, *see* Flags.

Flower: Sagebrush. **Bird:** Mountain bluebird. **Tree** Single-leaf piñon. **Song:** 'Home Means Nevada', words and music by Mrs. Bertha Raffetto.

THE GOVERNMENT



Capital: Carson City (since 1861, when it became territorial capital).

Representation in Congress: Senate, 2; House of Representatives, 1. Electoral votes, 3.

State Legislature: Senators, 17; term, 4 years. Assemblymen, 47; term, 2 years. Convenes the third Monday in January in the odd-numbered years. Session limit, 60 days.

Constitution: Adopted 1864. Proposed amendment may be (a) passed by a majority of elected members at two successive legislative sessions, or by initiative action of the people, and (b) ratified by a majority voting on amendment at a popular election.

Governor: Term, 4 years. May succeed himself.

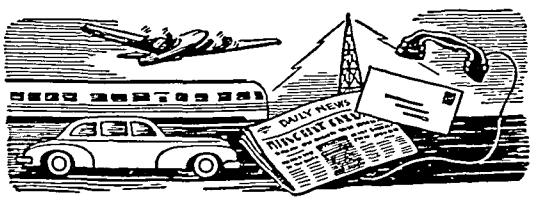
Other Executive Officers: Lieutenant governor, secretary of state, attorney general, treasurer, controller, surveyor-general, all elected; terms, 4 years.

Judiciary: Supreme court—3 justices, elected at large; term, 6 years. District courts—8, with 10 judges; judges elected; term, 4 years.

County: 17 counties, each governed by a board of commissioners of 3 members. Officers elected; terms, 4 and 2 years.

Municipal: Mayor and council most common; 3 cities have city managers and mayors. Boulder City (under Federal government) has commission plan.

Voting Qualifications: Age, 21; residence in state, 6 months; in county, 30 days; in district, 10 days.



TRANSPORTATION AND COMMUNICATION

Transportation: Railroads, 1,700 miles. First railroad, Sacramento, California, to Reno, 1868. Rural roads, 25,400 miles. Airports, 71.

Communication: Periodicals, 4. Newspapers, 30. First newspaper, *Territorial Enterprise*, Genoa, 1858. Radio stations (AM and FM), 9; first station, KOH, Reno, licensed Oct. 25, 1928. Television stations, 2. Telephones, 66,200. Post offices, 121.

THE PEOPLE AND THEIR LAND

Population (1950 census): 160,083 (rank among 48 states —48th); urban, 57.2%; rural, 42.8%. Density: 1.5 persons per square mile (rank—48th state).

Extent: Area, 110,540 square miles, including 751 square miles of water surface (6th state in size).

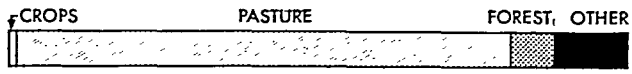
Elevation: Highest, Boundary Peak, 13,145 feet, near Mount Montgomery; lowest, Colorado River at southeast corner of state, 470 feet.

Temperature (°F.): Average—annual, 51°; winter, 33°; spring, 49°; summer, 70°; fall, 52°. Lowest recorded, —50° (San Jacinto, Jan. 8, 1937); highest recorded, 122° (Leeland, Nye County, Aug. 18, 1914, and other locations and earlier dates).

Precipitation: Average (inches)—annual, 9; winter, 3; spring, 3; summer, 1; fall, 2. Varies from about 4 in the south and west to about 20 in central west.

Natural Features: Much of Nevada lies within Great Basin of western United States (a giant mountain-ribbed depression whose rivers have no outlet to the sea); lofty Sierra Nevada along western border; areas of earliest rock formations (extreme southwest). Principal rivers: Carson, Colorado, Humboldt (flows into Humboldt Lake), Truckee, Walker.

Land Use: Cropland, 1%; nonforested pasture, 80%; forest, 7%; other (roads, parks, game refuges, wasteland, cities, etc.), 12%.



Natural Resources: *Agricultural*—open ranges provide excellent grazing for cattle and sheep. *Industrial*—important minerals, especially silver, gold, zinc, sand and gravel, lead, tungsten, and copper. *Commercial*—scenery, mountains, and climate attract vacationists.

OCCUPATIONS AND PRODUCTS

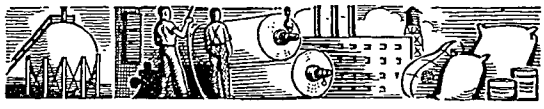
What the People Do to Earn a Living



Major Industries and Occupations, 1950

Fields of Employment	Number Employed	Percentage of Total Employed
Wholesale and retail trade	12,634	20.0
Transportation, communication, and other public utilities	7,405	11.6
Agriculture, forestry, and fishery	6,779	10.7
Personal services (hotel, domestic, laundering, etc.)	6,236	9.8
Construction	5,484	8.6
Professional services (medical, legal, educational, etc.)	4,988	7.8
Government	4,983	7.8
Amusement, recreation, and related services	3,967	6.2
Mining	3,315	5.2
Manufacturing	3,255	5.1
Business and repair services	1,928	3.0
Finance, insurance, and real estate	1,568	2.5
Workers not accounted for	1,093	1.7
Total employed	63,635	100.0

Nevada Fact Summary



What the People Produce

A. Manufactured Goods (Rank among states—47th)
Value added by manufacture* (1952), $31,889,000

Leading Industries in 1947 (with Principal Products)	Value Added by Manufacture	Rank among States
Food and Kindred Products..... Meat packing; beverages	$3,309,000	48
Chemicals and Allied Products.	3,115,000	41
Stone, Clay, and Glass Products Concrete and plaster products	2,942,000	41
Printing and Publishing.....	2,352,000	47
Primary Metal Industries..... Copper smelting and refining	.....†	.....

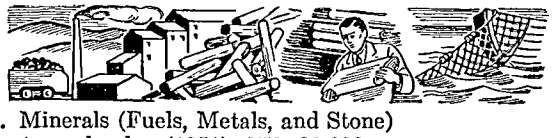
*For explanation of value added by manufacture, *see* Census.
†Figure withheld by Bureau of the Census.



B. Farm Products (Rank among states—47th)
Total cash income (1952), $51,668,000

Products	Amount Produced (10-Year Average)	Rank within State*	Rank among States†
Cattle.....	106,631,000 lbs.	1	38
Hay.....	622,000 tons	2	37
Milk.....	49,000,000 qts.	3	48
Sheep and lambs	20,649,000 lbs.	4	25

*Rank in dollar value †Rank in units produced



C. Minerals (Fuels, Metals, and Stone)
Annual value (1951), $57,626,000
Rank among states—30th

Minerals (1951)	Amount Produced	Value
Copper.....	56,000 tons	$27,333,000
Zinc.....	17,000 tons	6,349,000
Tungsten.....	1,000 tons	4,780,000
Gold.....	121,000 ozs.	4,236,000
Sand and gravel...	2,617,000 tons	2,658,000
Lead.....	7,000 tons	2,473,000

D. Trade

Trade (1948)	Sales	Rank among States
Wholesale.....	$ 79,498,000	48
Retail.....	200,916,000	48
Service.....	66,812,000	36

LARGEST CITIES (1950 census)

Reno (32,497): financial and commercial center of state; main industries based on mining, livestock, and lumber.
Las Vegas (24,624): tourist center near Hoover Dam and Lake Mead.
Sparks (8,203): adjoins Reno, forming one trading area.
Elko (5,393): resort city in livestock, mining country.
Boulder City (3,903): tourist center near Hoover Dam.
North Las Vegas (3,875): residential city.
Henderson (3,643): chemical and titanium plants.
Ely (3,558): mining center in livestock-dairying area.
Carson City (3,082): smallest state capital in the U. S.

EDUCATION



Public Schools: Elementary, 139; secondary, 32. Compulsory school age, 7 through 18. State Board of Education consists of the governor, state supt. of public instruction, and 5 lay members, one from each educational supervision district; all elected for 4-year terms. Members of county boards of education elected for 2- or 4-yr. terms. Trustees of district school boards appoint city supts. for 2-yr. probationary terms; 4-yr. terms thereafter.
Private and Parochial Schools: 7.
Colleges and University (accredited): The state-supported University of Nevada, Reno, has four colleges: arts and sciences, education, engineering, agriculture.
Special State Institution: Children's Home, Carson City.
Libraries: City and town public libraries, 13; independent county library systems, 8. State library responsible for aid in developing library service.
Outstanding Museums: Nevada State Museum, Carson City; Historical Society Museum, Reno.

CORRECTIONAL AND PENAL INSTITUTIONS

Nevada School of Industry (boys and girls), Elko; Nevada State Penitentiary, Carson City.

PLACES OF INTEREST*

Anaho Island—Pyramid L. large rookery of pelicans (10).
Bottle House—near Beatty; ghost town; walls built of bottles; desert relics (27).
Bowers Mansion—near Reno; former home of Lemuel "Sandy" Bowers, early Comstock millionaire (13).
Carson City—state capital named for Kit Carson; State Museum in Old Mint (operating 1870–93); Warren Engine Co. Firehouse, active since 1863 (14).
Charles Sheldon Antelope Wild Life Refuge—548,373-acre area extends north from Summit Lake (4).
Court of Antiquity—in Virginia Mts. near Reno; ancient Indian council meeting place; rock carvings (10).
Davis Dam—for power and control of water from Lake Mead for dams below on Colorado R.; south of (31).
Death Valley National Monument—vast desert in Nevada and California; salt beds; many scenic points (27).
'49 Canyon—names, dates chiseled on walls by travelers over Applegate Cut-off, pioneer road (3).
Hoover Dam—its crest is about ¼ mile long and more than 700 ft. high; creates man-made Lake Mead (31).
Lake Mead National Recreation Area—extends into Arizona; wildlife sanctuary; Indian ruins (32).
Lake Tahoe—picturesque mountain setting along California border; unusual depth, color, and clearness (17).
Lehman Caves National Monument—Snake Mt. caverns have interesting limestone chambers and galleries (19).
Liberty Pit—at Ruth; vast open-pit copper mine (16).
Mt. Rose—winter sports center near Reno (13).
Overton Museum—relics found in ruins of Lost City, an ancient Indian village now covered by Lake Mead (28).
Pyramid Lake—remnant of ancient Lake Lahontan (8).
Reno—ideal climate; fine parks; University of Nev. (13).
Ruby Lake (9) and Franklin Lake (7)—beautifully situated high in the Ruby Mts.; now federal game refuge.
Sod House—near Orovada; primitive building (5).
Stokes Castle—on hilltop west of Austin; built in 1870's when Austin was a booming mining camp (12).
Virginia City—buildings from mining days of 1870's; St. Mary's in the Mountains, church built 1877 (14).

*Numbers in parentheses are keyed to map.

Nevada Fact Summary

STATE PARKS*

Beaver Dam—a hunting base near Utah state line; provides excellent fishing (26).

Boulder Dam—Valley of Fire—red sandstone rock formations, some bearing ancient writings of prehistoric people (29).

Cathedral Gorge—near Panaca; rock formations look like cathedral spires (24).

Fort Churchill—near Carson River; ruins of abandoned army post built in 1860 to protect traveling pioneers (15).

Kershaw Canyon-Ryan—south of Caliente; rain- and wind-eroded cliffs (25).

NATIONAL FORESTS*

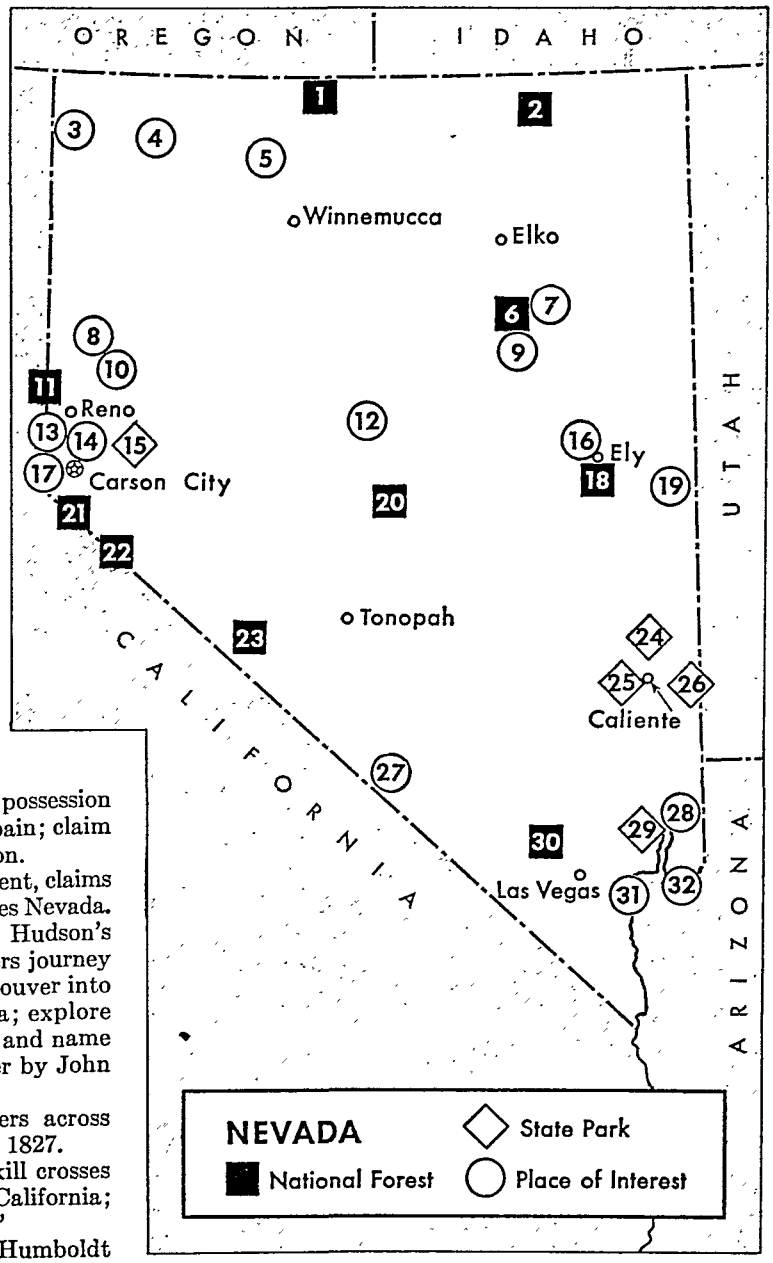
Eldorado—400 acres in state; total, 886,247 acres in Nevada and California; headquarters, Placerville, Calif. (21).

Humboldt—1,182,522 acres; headquarters, Elko (2, 6).

Inyo—62,348 acres in state; total, 1,844,017 acres in Nevada and California; headquarters, Bishop, Calif. (23).

Nevada—1,259,528 acres; headquarters, Ely (18, 30).

Toiyabe—2,871,780 acres in state; total, 3,567,563 acres in Nevada and California; headquarters, Reno (1, 11, 20, 22).



THE PEOPLE BUILD THEIR STATE



1598—Juan de Oñate takes possession of New Mexico for Spain; claim includes Nevada region.

1821—Mexico, now independent, claims Southwest area; includes Nevada.

1825—Peter S. Ogden and Hudson's Bay Company trappers journey down from Fort Vancouver into northeastern Nevada; explore area around Humboldt Basin; discover and name Ogden River (renamed Humboldt River by John C. Frémont).

1826—Jedediah Smith leads party of trappers across Nevada en route to California; returns, 1827.

1830—Party of traders led by William Wolfskill crosses southern Nevada region en route to California; route becomes the "Old Spanish Trail."

1833—Joseph Walker's expedition follows Humboldt River in search of new fur-trading country.

1841—Trickle of American settlers to California begins to follow Humboldt Trail through Nevada.

1843—John C. Frémont explores Nevada, passing along Pyramid Lake, Humboldt Basin, and Truckee and Carson rivers; crosses southern Nevada, 1844; re-explores area, 1845; writes detailed reports, arousing much interest in region.

1848—Nevada included in territory ceded by Mexico to U. S. by Treaty of Guadalupe-Hidalgo, February 2.

1849—Mormons at Salt Lake City organize State of Deseret, which includes Nevada. H. S. Beatie builds Mormon Station at Carson Valley. "Forty-niners" cross Nevada on way to California gold fields.

1850—Congress creates Utah Territory, September 9; it includes most of present Nevada; southern part included in New Mexico Territory.

1851—John Reese builds trading post in Carson Valley. Mail service between Sacramento and Salt Lake City established by way of Carson Valley.

1854—Utah territorial government creates Carson County; it includes most of Nevada; Genoa (old Mormon Station) becomes county seat; government headed by Orson Hyde, one of Mormon Twelve Apostles. Opening of wagon route across Sierra Nevada links Nevada with Sacramento.

1855—Mormon trading post opened near Las Vegas.

1857—Brigham Young recalls Mormons from Nevada to defend Salt Lake area from threatened U. S. army attack; other settlers buy Mormon farms and property. Group led by Isaac Roop convenes at Genoa, draws up constitution for Nevada Territory, and petitions Congress for territorial status; Congress ignores the petition.

1859—Provisional government organized by settlers, September 2; Isaac Roop elected governor. Comstock Lode (silver and gold) discovered in Washoe Valley; prospectors rush to site. Virginia City springs up.

1860—Settlers battle with Indians near Pyramid Lake; Fort Churchill built for protection from Indians.

*Numbers in parentheses are keyed to map.

Nevada Fact Summary

Pony Express begins running between Missouri and California via Nevada; ends 1861, with completion of transcontinental telegraph line.

1861—Nevada Territory created, March 2; capital, Carson City; governor, James W. Nye; territory tentatively includes part of eastern California but California refuses to accede; in repayment Nevada receives part of western Utah, 1862; receives more of Utah and northern Arizona, 1866, to achieve present state boundaries.

1862—Indians attack whites in eastern Nevada; Fort Ruby established, and Indians flee into desert.

1863—Statehood enabling act passed by Congress; convention drafts constitution, rejected by voters.

1864—Second statehood enabling act passed; acceptable constitution drafted. Nevada admitted to Union as 36th state, October 31; capital, Carson City; governor, Henry G. Blasdel.

1865—State-wide school system established. Sutro Tunnel at Comstock Lode started; completed, 1878.

1868—Central Pacific Railroad reaches Reno, May 2; connects with Union Pacific Railroad in Utah to complete transcontinental route, May 10, 1869.

1870—U. S. Mint at Carson City begins operation; minting ceases, 1893; building now state museum.

1873—U. S. stops free coinage of silver; "free coinage" becomes national political issue. "Big Bonanza" vein of silver ore discovered along Comstock Lode.

1874—University of Nevada founded at Elko; moves to Reno, 1886.

1878—Bland-Allison Act provides for U. S. government purchases of limited amount of silver; act fails to *solve Nevada miners' problems; many leave.*

1893—Repeal of silver purchase act causes more Nevada mines to shut down; economic crisis makes Silver party dominant political force in state; it merges with Democrats under William J. Bryan, 1896.

1900—Tonopah silver mines discovered; Ely copper mines developed. Population rises after these strikes and opening of Goldfield mines, 1903.

1903—Los Angeles and Salt Lake Railroad through Las Vegas begun; now in Union Pacific system.

1904—Referendum adopted; initiative adopted, 1912.

1907—Newlands irrigation project in Storey County completed.

1914—World War I booms state's mining industry. Constitutional amendment grants women's suffrage.

1924—First execution by lethal gas in the world conducted at Nevada State Prison.

1930—Work on Hoover Dam begins; Boulder City built for workers, begun 1931; dam dedicated, 1935.

1931—Passage of six weeks' divorce law and legalizing of gambling bring many divorce seekers and tourists to state; Reno and Las Vegas boom.

1938—Rye Patch Dam on Humboldt River completed.

1941—Magnesium mines opened near Las Vegas.

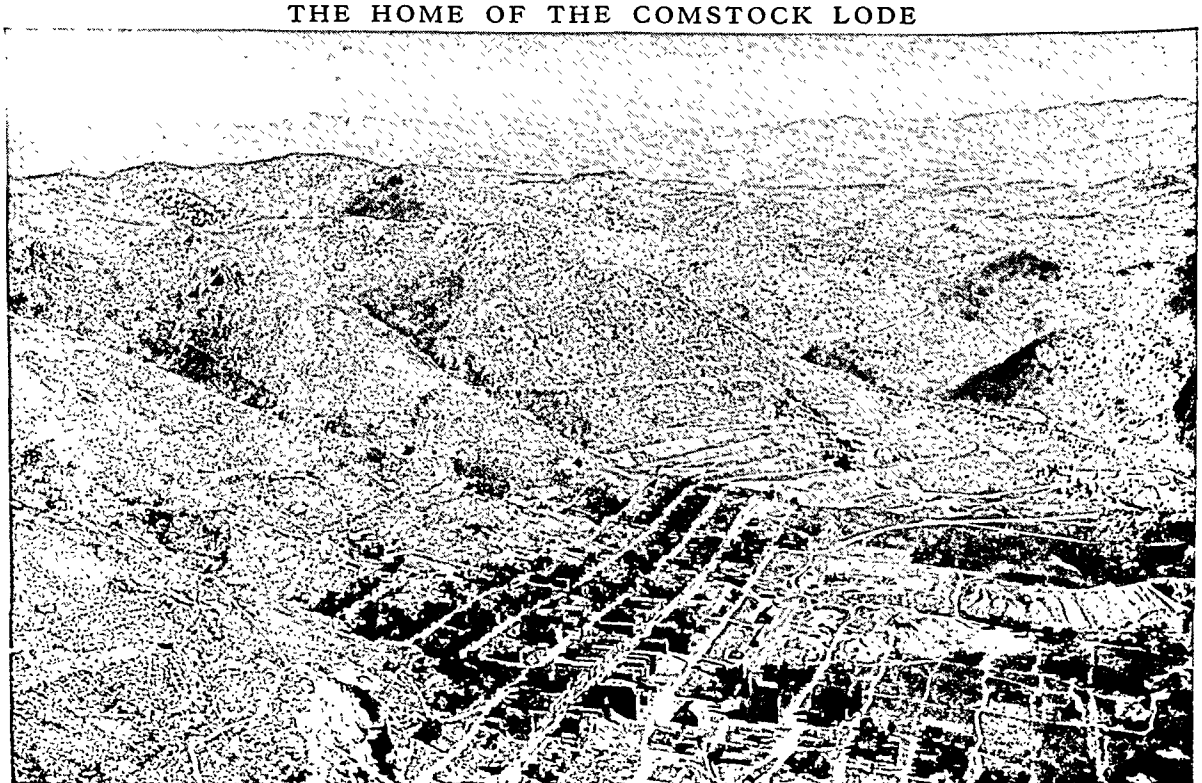
1949—Locusts devastate ranches. Davis Dam on Colorado River completed; generates power, 1951.

1951—Atomic Energy Commission tests atomic weapons near Las Vegas. First atomic warfare maneuver staged on Nevada desert. Nevada is 36th and last state to ratify 22d amendment to U. S. Constitution, limiting president to two terms.

1952—Atomic tests and maneuvers continue in Nevada.

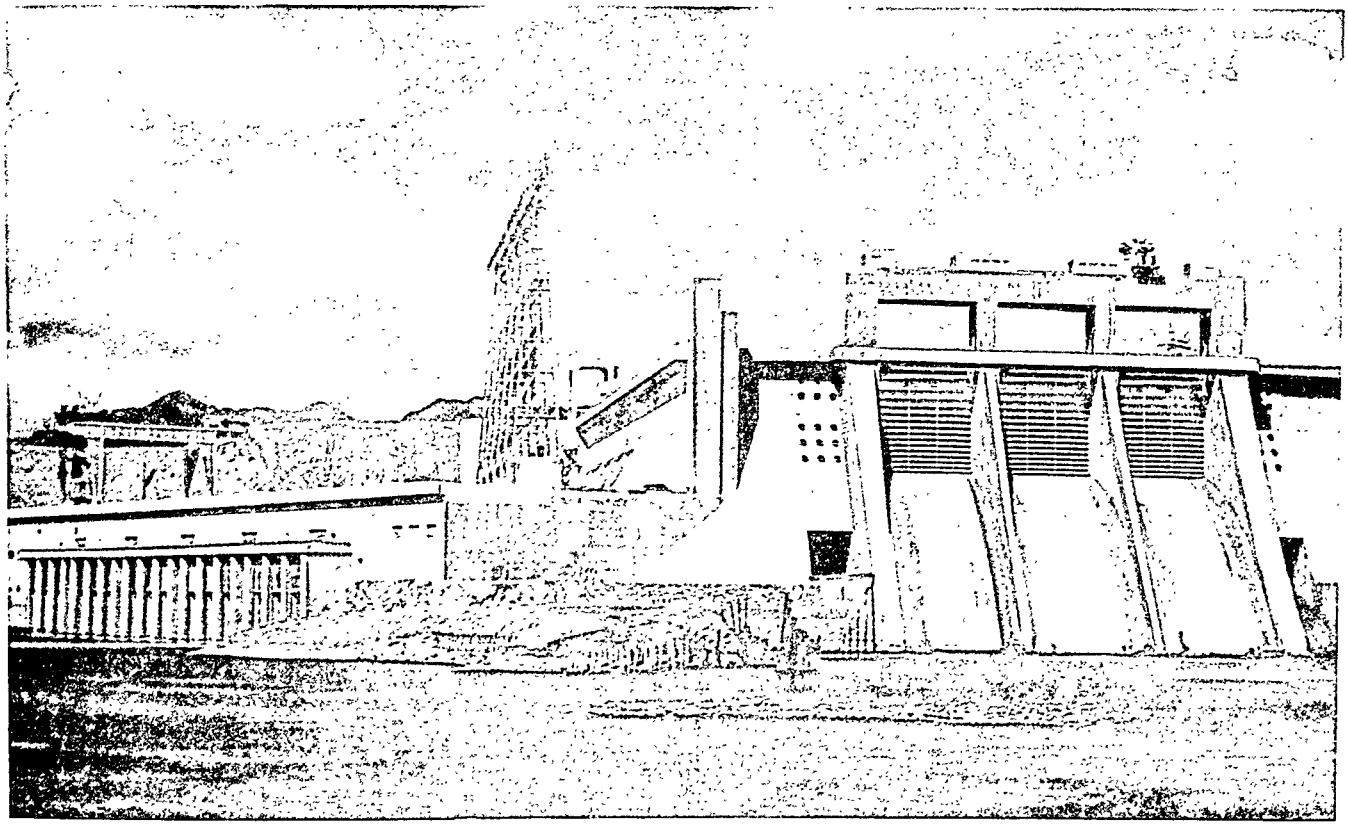
1953—First atomic shell and more atomic bombs detonated in state. *Serious drought hits some areas.*

THE HOME OF THE COMSTOCK LODE



Virginia City, situated between Reno and Carson City, stands on the silver mines of the Comstock Lode, which gave it fabulous wealth. The underground workings of the mines in the hills extended under the city. As the nation's chief mining city in the 1870's, it had about 35,000 residents. Today less than 1,000 people live here. Gold and silver are still mined in the area.

ANOTHER KEY DAM IN THE TAMING OF THE UNRULY COLORADO



Davis Dam is a major structure in the power and navigation development of the lower Colorado River. Here the river forms the boundary between Nevada and Arizona. At left is the powerhouse; at right, the spillway. The dam holds back Lake Mohave.

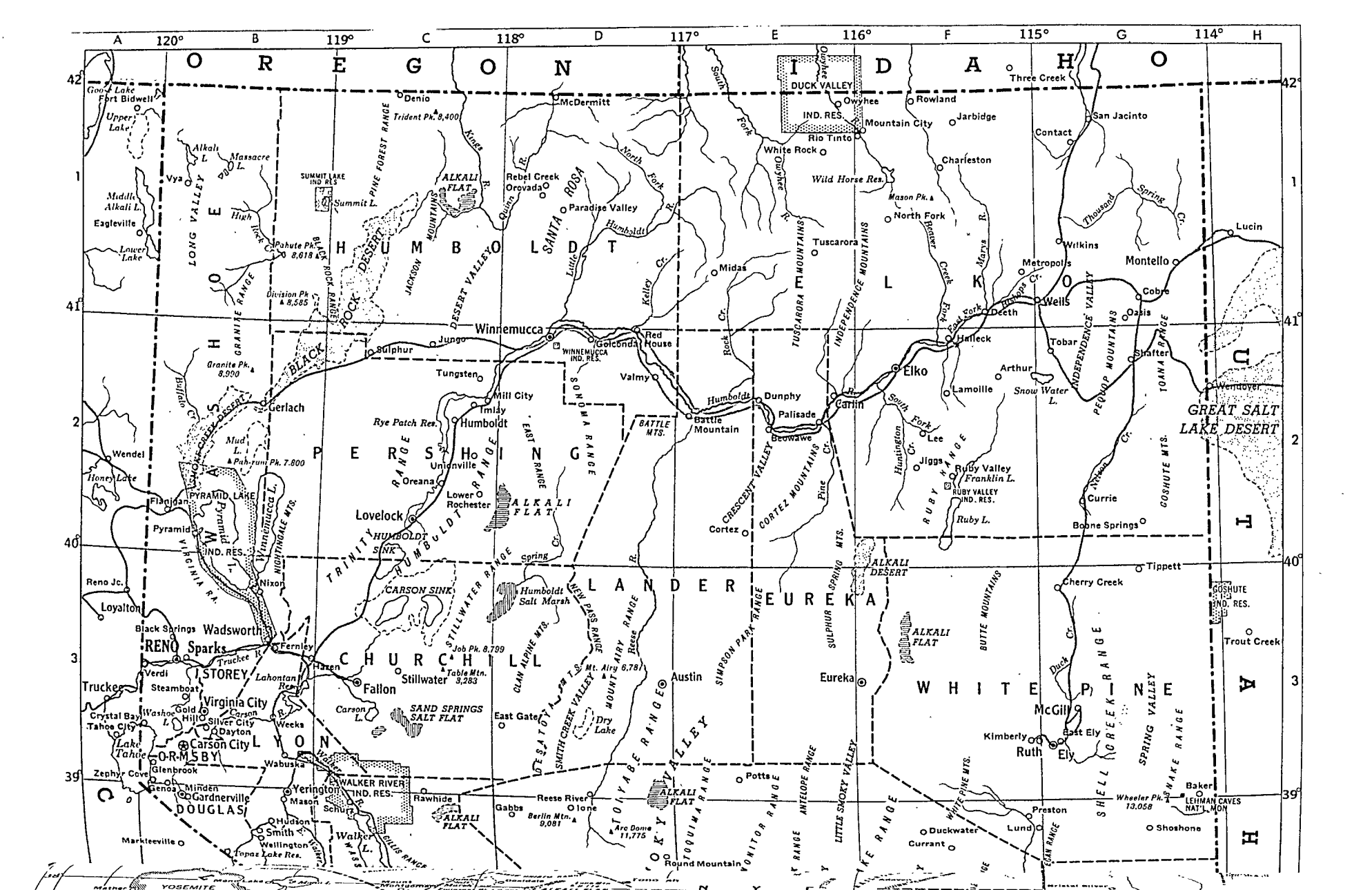
NEVADA

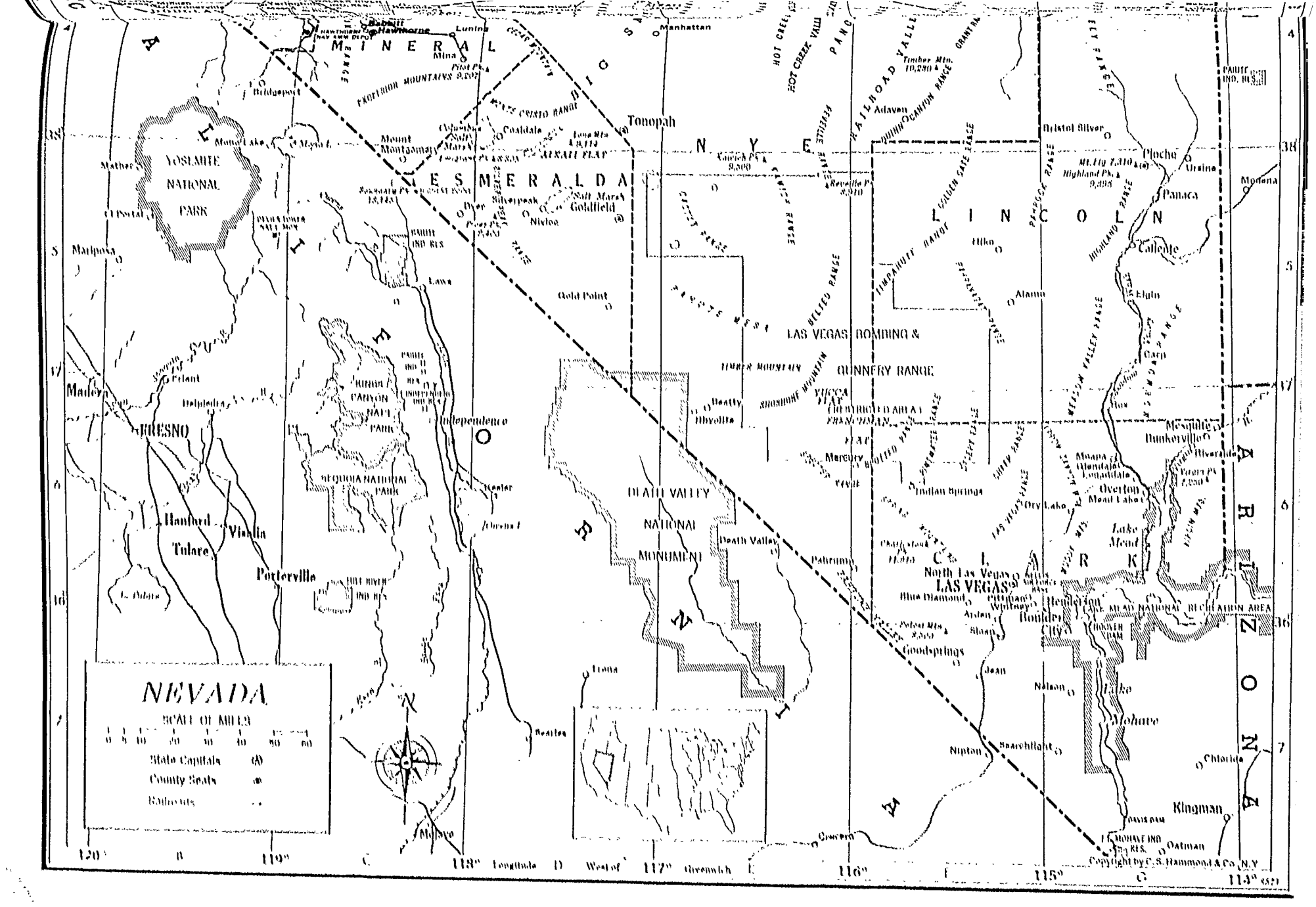
COUNTIES

Churchill	6,161	C 3
Clark	48,289	F 6
Douglas	2,029	B 4
Elko	11,654	F 1
Esmeralda	614	D 5
Eureka	896	E 3
Humboldt	4,838	C 1
Lander	1,850	D 3
Lincoln	3,837	F 5
Lyon	3,679	B 3
Mineral	5,560	C 4
Nye	3,101	E 5
Ormsby	4,172	B 3
Pershing	3,103	C 2
Storey	671	B 3
Washoe	50,205	B 2
White Pine	9,424	F 3

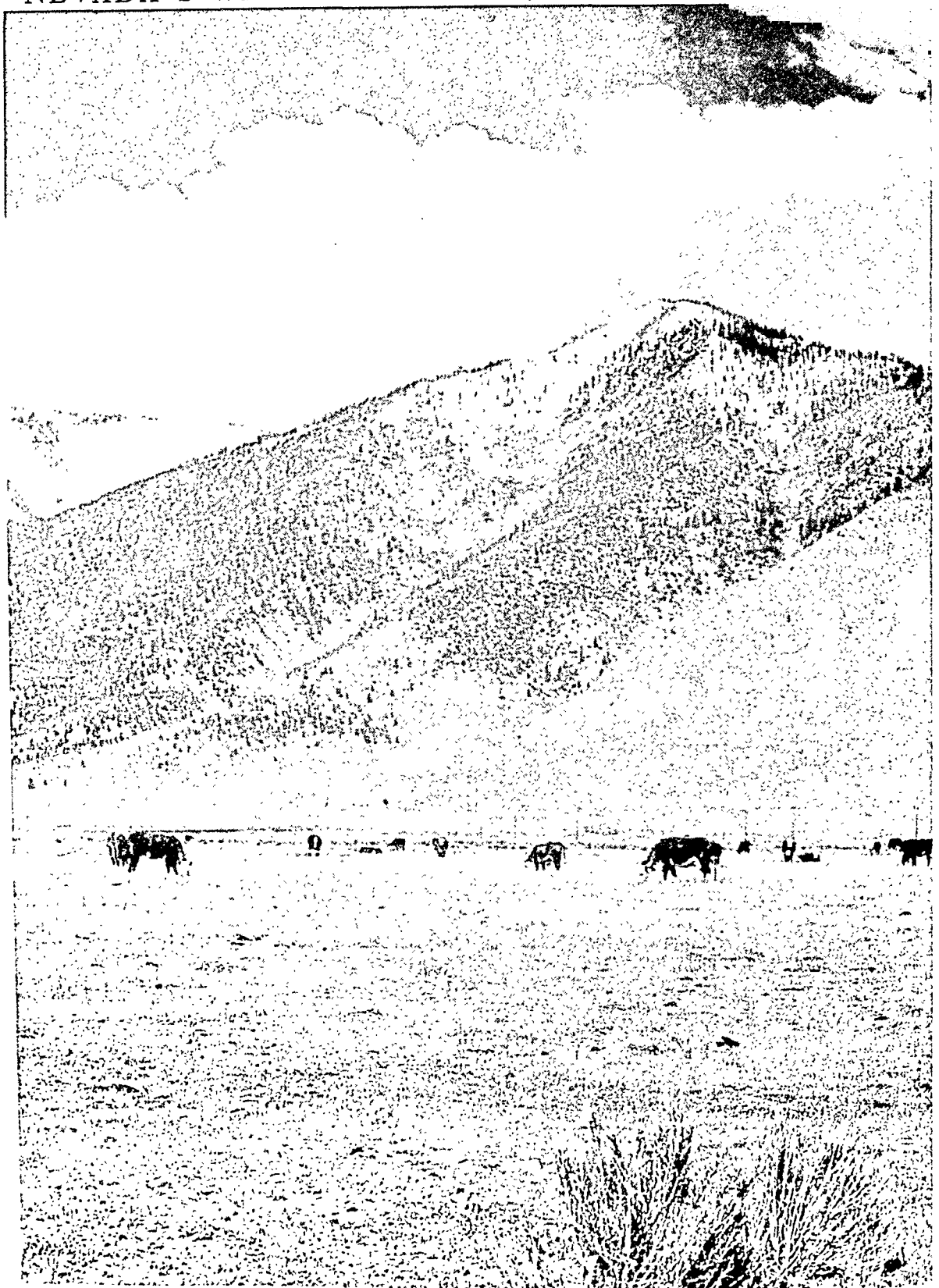
CITIES AND TOWNS

Adaven	25	F 4
Alamo	384	F 5
Arden	43	F 6
Arthur	3	F 2
Austin	300	E 3
Babbitt	2,464	C 4
Baker	50	G 3
Battle Mt.	850	E 2
Beatty	485	E 6
Beowawe	175	E 2
Black Springs	100	B 3
Blue Diamond	210	F 6
Boone Springs	12	G 2
Boulder City	3,903	G 7
Bristol Silver	25	G 4
Bunkerville	180	G 6
Caliente	970	G 5
Carlin	1,203	E 2
Carp	120	G 5
CARSON CITY	3,082	B 3
Charleston	51	F 1
Cherry Creek	75	G 3
Coaldale	16	D 4
Cobre	51	G 1
Contact	20	G 1
Cortez	7	E 2
Crystal Bay	150	A 3
Currant	50	F 4
Currie	52	G 2
Dayton	300	B 3
Deeth	75	F 1
Denio		C 1
Dry Lake	48	G 6
Duckwater	5	F 4
Dunphy	6	E 2
Dyer	87	C 5
East Ely	1,000	G 3
East Gate	10	D 3
Elgin	50	G 5
Elko	5,393	F 2
Ely	3,558	G 3
Eureka	500	E 3
Fallon	2,400	C 3
Fernley	650	B 3
Flanigan	44	B 2
Gabbs	278	D 4
Gardnerville	600	B 4
Genoa	75	B 4
Gerlach	200	B 2
Glenbrook	30	B 3
Glendale	20	G 6
Golconda	350	D 2
Gold Hill	6ℰ	B 3
Gold Point	100	D 5
Goldfield	275	D 5
Goodsprings	175	F 7
Halleck	52	F 2
Hawthorne	1,861	C 4
Hazen	70	C 3
Henderson	3,643	G 6
Hiko	23	F 5
Hudson	2	B 4
Humboldt	30	C 2
Imlay	250	C 2
Indian Springs	50	F 6
Ione	38	D 4
Jarbidge	46	F 1
Jean	52	F 7
Jiggs	100	F 2
Jungo	30	C 2
Kimberly	300	F 3
Lamoille	200	F 2
Las Vegas	24,624	F 6
Lee	135	F 2
Logandale	300	G 6
Lovelock	1,604	C 2
Lower Rochester	5	C 2
Lund	365	F 4
Luning	52	C 4
Manhattan	125	E 4
Mason	89	B 4
McDermitt	100	D 1
McGill	2,297	G 3
Mercury		F 6
Mesquite	540	G 6
Metropolis	15	G 1
Midas	100	E 1
Mill City	35	D 2
Mina	274	C 4
Minden	250	B 4
Moapa	18	G 6
Montello	350	G 1
Mount Montgomery	19	C 5
Mountain City	180	F 1
Nelson	67	G 7
Nivloc	4	D 5
Nixon	450	B 3
North Fork	31	F 1
North Las Vegas	3,875	F 6
Oasis	25	G 1
Oreana	24	C 2
Orovada	150	D 1
Overton	750	G 6
Owyhee	40	F 1
Pahrump	120	E 6
Palisade	53	E 2
Panaca	499	G 5
Paradise Valley	95	D 1
Pioche	1,392	G 5
Pittman	150	F 6
Potts	35	E 3
Preston	45	G 4
Pyramid	27	B 2
Rawhide	10	C 4
Rebel Creek	10	D 1
Red House	13	D 2
Reese River	184	D 4
Reno	32,497	B 3
Rhyolite		E 6
Rio Tinto	1	E 1
Riverside	25	G 6
Round Mountain	305	E 4
Rowland	11	F 1
Rox	20	G 6
Ruby Valley	200	F 2
Ruth	1,244	F 3
San Jacinto	6	G 1
Schurz	150	C 4
Searchlight	229	F 7
Shafter	91	G 2
Shoshone	25	G 4
Silver City	200	B 3
Silverpeak	63	D 5
Sloan	200	F 7
Smith	28	B 4
Sparks	8,203	B 3
Steamboat	94	B 3
Stillwater	9	C 3
Sulphur	33	C 2
Tippett	50	G 3
Tobar	10	G 2
Tonopah	1,375	D 4
Tungsten	300	C 2
Tuscarora	30	E 1
Unionville	15	C 2
Ursine	60	G 5
Valmy	75	D 2
Verdi	350	B 3
Virginia City	800	B 3
Vya	30	B 1
Wabuska	50	B 3
Wadsworth	275	B 3
Weeks	200	B 3
Wellington	60	B 4
Wells	947	G 1
White Rock	26	E 1
Whitney	200	F 6
Wilkins	60	G 1
Winnemucca	2,847	D 2
Yerington	1,157	B 4
Zephyr Cove	50	A 3


A 120° B 119° C 118° D 117° E 116° F 115° G 114° H
42 1 41 2 40 3 39
OREGON
IDAHO
WASHOE
HUMBOLDT
LANDER
EUREKA
WHITE PINE
PERSHING
CHURCHILL
LYON
STOREY
CARSON
DOUGLAS
ORMSBY
ELKO
NEVADA
Goose Lake
Fort Bidwell
Upper Lake
Denio
McDermitt
Three Creek
DUCK VALLEY IND. RES.
Owyhee
Rowland
Jarbidge
San Jacinto
Contact
Rio Tinto
Mountain City
White Rock
Charleston
Wild Horse Res.
Mason Pk.
North Fork
Lucin
Wilkins
Montello
Metropolis
Cobre
Oasis
Wells
Deeth
Halleck
Tobar
Shafter
Arthur
Elko
Lamoille
Snow Water L.
Weiser
GREAT SALT LAKE DESERT
Tuscarora
Midas
Winnemucca
Jungo
Sulphur
Golconda
Red House
WINNEMUCCA IND. RES.
Valmy
Tungsten
Mill City
Imlay
Humboldt
Dunphy
Palisade
Carlin
Battle Mountain
Beowawe
Gerlach
Granite Pk. 8,990
Rye Patch Res.
Mud L.
Pah-rum Pk. 7,800
Wendel
Honey Lake
Oreana
Unionville
Lovelock
Lower Rochester
Cortez
Jiggs
Ruby Valley
Franklin L.
RUBY VALLEY IND. RES.
Ruby L.
Currie
Boone Springs
Tippett
Cherry Creek
GOSHUTE IND. RES.
Trout Creek
Flanigan
PYRAMID LAKE
Pyramid
PYRAMID L. IND. RES.
Nixon
Reno Jct.
Loyalton
Black Springs
Wadsworth
RENO
Sparks
Fernley
Verdi
Truckee
Steamboat
Hazen
Stillwater
Fallon
Austin
Eureka
McGill
Ruth
Ely
East Ely
Kimberly
Virginia City
Gold Hill
Silver City
Dayton
Carson City
Crystal Bay
Tahoe City
Lake Tahoe
Zephyr Cove
Glenbrook
Genoa
Minden
Gardnerville
Carson L.
Weeks
Fallon Naval Air Station
SAND SPRINGS SALT FLAT
East Gate
Dry Lake
Wabuska
Yerington
Mason
Schurz
WALKER RIVER IND. RES.
Rawhide
Reese River
Gabbs
Ione
Berlin Mtn. 9,081
Potts
Currant
Duckwater
Preston
Lund
Shoshone
Baker
Wheeler Pk. 13,058
LEHMAN CAVES NAT'L. MON.
Hudson
Smith
Wellington
Topaz Lake Res.
Walker L.
Markleeville
Round Mountain
Arc Dome 11,775
Summit L.
Pahute Pk. 8,618
Division Pk. 8,585
Trident Pk. 8,400
Job Pk. 8,799
Table Mtn. 9,283
Mt. Airy 6,781
Paradise Valley
Orovada
Rebel Creek
Quinn R.
Kings R.
North Fork R.
Humboldt R.
Little Humboldt R.
Owyhee R.
South Fork
Thousand Spring Cr.
Marys R.
Bishops Cr.
Kelley Cr.
Rock Cr.
Huntington Cr.
Pine Cr.
Northeast Cr.
Duck Cr.
Spring Cr.
Truckee R.
Lahontan Res.
Carson R.
Walker R.
Reese R.
Humboldt Salt Marsh
HUMBOLDT SINK
CARSON SINK
ALKALI FLAT
ALKALI DESERT
BATTLE MTS.
SONOMA RANGE
EAST RANGE
STILLWATER RANGE
CLAN ALPINE MTS.
NEW PASS RANGE
REESE RIVER RANGE
SIMPSON PARK RANGE
SULPHUR SPRING MTS.
BUTTE MOUNTAINS
TOIYABE RANGE
TOQUIMA RANGE
ANTELOPE RANGE
MONITOR RANGE
LITTLE SMOKY VALLEY
SMITH CREEK VALLEY
DIAMOND VALLEY
SPRING VALLEY
SHELL CREEK RANGE
SNAKE RANGE
WHITE PINE MTS.
PEQUOP MOUNTAINS
TOANA RANGE
GOSHUTE MTS.
INDEPENDENCE MOUNTAINS
TUSCARORA MOUNTAINS
CRESCENT VALLEY
CORTEZ MOUNTAINS
RUBY RANGE
SONOMA RANGE
SOUTH FORK RESERVOIR
LONG VALLEY
PINE FOREST RANGE
BLACK ROCK DESERT
SMOKE CREEK DESERT
GRANITE RANGE
JACKSON MOUNTAINS
DESERT VALLEY
SANTA ROSA MOUNTAINS
TRINITY RANGE
VIRGINIA RA.
NIGHTINGALE MTS.
CALIFORNIA
YOSEMITE


NEVADA
SCALE OF MILES
0 5 10 20 30 40 50 60
State Capitals
County Seats
Railroads
MINERAL
ESMERALDA
NYE
LINCOLN
CLARK
ARIZONA
INYO
TULARE
FRESNO
MADERA
MARIPOSA
YOSEMITE NATIONAL PARK
SEQUOIA NATIONAL PARK
KINGS CANYON NATIONAL PARK
DEATH VALLEY NATIONAL MONUMENT
LAS VEGAS BOMBING & GUNNERY RANGE
LAKE MEAD NATIONAL RECREATION AREA
Hawthorne
Tonopah
Goldfield
Beatty
Independence
Bishop
Lone Pine
Owens L.
Death Valley
Las Vegas
North Las Vegas
Henderson
Boulder City
Overton
Moapa
Logandale
Glendale
Mesquite
Bunkerville
Panaca
Caliente
Elgin
Alamo
Hiko
Pioche
Ursine
Modena
Bristol Silver
Adaven
Manhattan
Luning
Mina
Bridgeport
Mono Lake
Lee Vining
Mammoth Lakes
Mount Montgomery
Coaldale
Silverpeak
Nivloa
Gold Point
Lida
Oasis
Benton
Tecopa
Shoshone
Tecopa Hot Springs
Furnace Creek
Stovepipe Wells
Scotty's Castle
Ryan
Trona
Searles
Mojave
Rosamond
Edwards
Nipton
Searchlight
Goodsprings
Jean
Nelson
Lake
Mohave
Chloride
Kingman
Oatman
Yucca
Parker
Indian Springs
Mercury
Rhyolite
Lathrop Wells
Pahrump
Blue Diamond
Arden
Sloan
Whitney
Paiute Ind. Res.
Timber Mts. 10,280
Highland Pk. 9,295
Mt. Irv 7,310
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120° B 119° C 118° Longitude D West of 117° Greenwich E 116° F 115° G 114°

NEVADA'S WEALTH—CATTLE, MINERALS, SCENERY



Cattle raising is one of Nevada's chief sources of income. Mountains, such as the snow-capped Sierra Nevada in the background, add to the wealth of the state. They contain valuable deposits of ore and their scenery attracts many tourists.

NEWARK, N. J. Of all the cities in New Jersey, Newark is the largest, because of its transportation advantages. The city grew up on the flatlands surrounding Newark Bay at the mouth of the Passaic River. It is the place where railroad, truck, and bus lines from the south and west meet on their way to New York City, eight miles to the east. It has the Port Newark terminal, which was built during the first World War to serve ocean shipping and shipbuilding. It also has a large and modern airport. Both the harbor and the airport facilities are part of the Port of New York Authority. Newark is the county seat of Essex County.

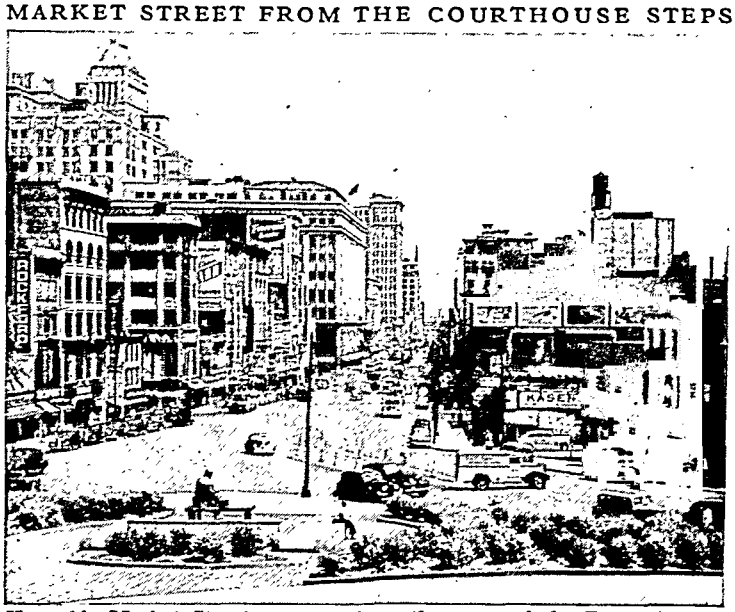
Good transportation accounts for Newark's industrial growth. Early in its history the town was a center of small specialized industries employing skilled workmen. At the present time, the city is outstanding in the manufacture of electrical equipment of all kinds and is well-known as a jewelry-making center. Other important products are paints, varnishes, metal products, clothing, and natural and artificial leather. Many large insurance companies have their headquarters in Newark.

The heart of the business district is the intersection of Market and Broad streets, known as the "Four Corners." A few blocks to the north, on Broad Street, is Military Park, so called because the site was a colonial military training ground. Near by is Washington Park, which was laid out in 1667 as the village market place. There are seven county parks either wholly or partly in Newark. Branch Brook Park, the largest, is noted for its 2,500 cherry trees.

Institutions of higher education include a state teachers college, the Newark Colleges of Rutgers University, the Newark College of Engineering, and the Urban Division of Seton Hall College. The Newark Museum is noted for its work with children and its coöperation with the public schools. The Newark Public Library has contributed much to the cultural and business life of the city and has long been recognized as one of the nation's finest.

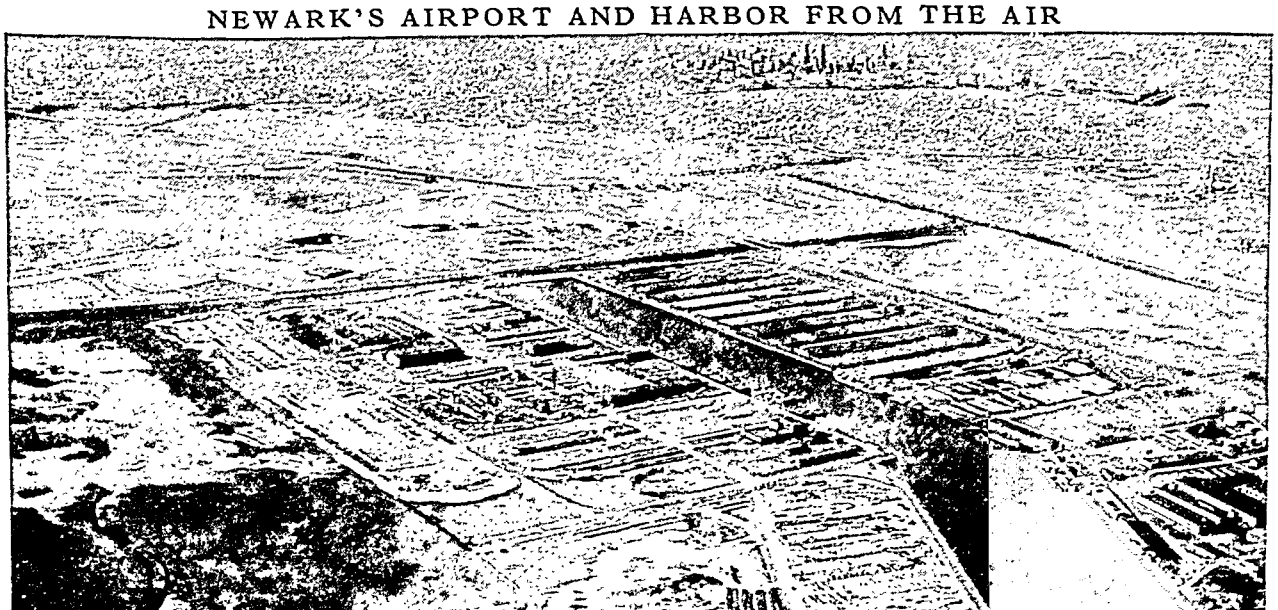
Newark was founded in 1666 by a group of Puritans from Connecticut under the leadership of Robert Treat. Most historians believe that its name was taken from Newark-on-Trent in England, as an honor to Newark's first pastor who had been ordained there. Others believe that Newark may originally have been New Ark, or New Work, referring to the fresh start of the community. The city was granted a charter in 1836. Population (1950 census), 438,776.

MARKET STREET FROM THE COURTHOUSE STEPS



Newark's Market Street, as seen from the steps of the Essex County Courthouse, presents a bustling and businesslike scene. In the foreground is the famous bronze statue of Abraham Lincoln seated, by Gutzon Borglum.

NEWARK'S AIRPORT AND HARBOR FROM THE AIR



This Fairchild Aerial Surveys photo shows how Port Newark slices deep into the land. Along its square-cut edges are facilities for handling ocean vessels and their cargoes. Beyond the harbor is Newark Airport, and in the distance, the city's skyscrapers.

HONORING NEW BEDFORD'S HEROIC WHALEMEN



In front of New Bedford's public library stands the Whaleman Statue, by Bela Pratt, inscribed with the whalemen's heroic motto, "A dead whale or a stove boat." These hunters of the sea brought imperishable fame to the town as well as an era of great prosperity.

NEW BEDFORD, MASS. The Massachusetts state capitol once had a codfish for a weather vane. The City Hall of New Bedford in the old days should have displayed a whale, for all the traditions of this city are connected with the whaling industry. That is why the lawn of the public library features the well-known Whaleman Statue. The library has the largest and finest collection of whaling books and prints in existence, and the Bourne Museum exhibits a full-rigged whaling vessel.

For many years New Bedford was the principal whaling port of the world. Beginning in the middle 1700's whales were hunted off the Virginia and Carolina coasts, and later in West Indian and South American waters. After 1791 the whalers regularly rounded Cape Horn into the Pacific, and after 1848 Arctic whaling brought even better times to the trade. In 1857 the city had 329 registered whaling ships. Soon after the discovery of oil in Pennsylvania in 1859, kerosene replaced whale oil as the main fuel for lighting, and the whaling industry fell off sharply.

After the decline of whaling, the city's prosperity was based on its manufactures, chiefly of fine cotton goods. Although much of this industry moved to the South, cotton mills still employ thousands of workers. Many of the cotton, rayon, and silk mill workers are trained in the New Bedford Textile Institute. Today the city has many different industries which make cotton, silk, and rayon yarns and cloth; tools, mill supplies, and screws; electrical appliances and devices, glassware, ropes, paper and rubber goods, sheet copper and brass, shoes, clothing, and toys. Fishing and boatbuilding are also important industries.

New Bedford is on the Acushnet River at the head of Buzzards Bay, 56 miles south of Boston. It was settled in 1652 and incorporated as a city in 1847. During the American Revolution it sent out many privateer vessels and in 1778 it was captured by a British fleet and almost destroyed. Population (1950 census), 109,189.

NEWBERY, JOHN (1713-1767). The first bookseller and publisher to make a specialty of children's books was John Newbery. Over his shop in St. Paul's Churchyard, London, was the sign *Juvenile Library*. An advertisement in the *London Chronicle* for December 1765 states: "On the first of January, being New Year's Day, Mr. Newbery intends to publish the following important volumes, bound and gilt, and hereby invites all his little friends who are good to call for them at the *Bible and Sun* in St. Paul's Churchyard, but those who are naughty to have none."

Thousands of Mr. Newbery's "little friends" owned his books. Today many American children know his name because of the Newbery Medal, awarded each year to the book selected by a committee of children's librarians as the best book for children published during the year.

John Newbery was born on July 19, 1713, in the village of Waltham St. Lawrence, Berkshire. His father was a farmer and would have liked his son to carry on the farm, but John preferred books. An ancestor, Ralph Newbery, had been a publisher; and when John went to work it was in a newspaper and printing business. After his master's death, John married his widow. She had three children and three more were born to her and Newbery.

In 1744 Newbery opened his own shop in London, at the sign of the *Bible and Crown*. Before long he moved to St. Paul's Churchyard, at the sign of the *Bible and Sun*. Here he published many books for children and adults, writing some of the children's books himself. Among his authors were Oliver Goldsmith and Dr. Samuel Johnson. Newbery also had a flourishing business in patent medicines, the most famous of which was "Dr. James's Fever Powder."

Of Newbery as a person, not a great deal is known and there is no portrait of him. His biographer, Charles Welsh, says Newbery was "a red-faced, good-natured man, always in a hurry." His authors also give some description of him. Goldsmith mentions him in 'The Vicar of Wakefield' as "the philanthropic bookseller of St. Paul's Churchyard who has written so many little books for children." He tells us that Newbery "called himself the friend of children but was the friend of all mankind." Dr. Johnson portrays him amusingly as Jack the Whirler "ever on business of the utmost importance." "When he enters a house

his first declaration is that he cannot sit down." He "dined at full speed," complained of "lack of time," and suffered "perpetual fatigue."

No doubt a kindly man, Mr. Newbery was also a shrewd publisher and clever at advertising his goods. The patent medicine sometimes appeared in the stories, and the characters were always taking "one of Mr. Newbery's little books" out of their pockets. In 'Goody Two Shoes', Margery's father died because he fell ill in a place where Dr. James's Fever Powder could not be obtained.

AN EIGHTEENTH-CENTURY BOOKSHOP



This is what Mr. Newbery's bookshop in St. Paul's Churchyard, London, must have looked like. There he sold all sorts of fascinating little books for children. The picture is by Katherine Milhous, from Alice Dalgliesh's 'A Book for Jennifer' (Scribner).

The little books were "well bound" as the advertisements often stated. The binding was important, because up to this time most books had been paper pamphlets. Some of the books, so John Newbery insisted, were "free." One paid only a penny or two-pence "for the binding"! They were attractive little books in their "flowery and gilt" paper bindings. Leigh Hunt called them "little penny books radiant with gold and rich with bad pictures." The pictures now seem quaint and attractive to us.

The first book published by Newbery, in 1744, was 'A Little Pretty Pocket Book' *intended for the instruction and amusement of Little Master Tommy and Pretty Miss Polly. With Two Letters from Jack the Giant Killer; As also A Ball and a Pincushion; The use of which will infallibly make Tommy a good Boy and Polly a good Girl.* The pincushion was made with one red side and one black, into which "Polly" was supposed to stick pins for good and bad actions.

Other Newbery books were published between 1760 and 1765. 'Mother Goose's Melody or Sonnets for the Cradle' contained on each page a moral remark. On the page with "Great A, little a, Bouncing B. The Cat's in the Cupboard, And she can't see," the moral is *Yes, she can see that you are naughty and don't mind your book.* One of the most entertaining books was about Giles Gingerbread, who learned to read by eating letters of the alphabet made in gingerbread.

An interesting Newbery book was 'An Important Pocket Book or The Valentine's Ledger', a small volume bound in brown leather, in which a child was supposed to record "good" and "bad" behavior. We know that some children of the 18th century actually kept this "moral account," because one of the books, with entries made by a little girl, is still in existence.

John Newbery died on Dec. 22, 1767, at the age of 54. The epitaph on his grave describes "the humble wisdom that . . . teaches moral lessons to the rising generation." His son, Francis, followed him in the business and published many books for children.

NEW BRUNSWICK—*Land of* FORESTS *and* RIVERS

NEW BRUNSWICK, CANADA. An aviator flying over this Maritime Province of Canada sees a vast forest, threaded with silver rivers and washed on three sides by the ocean. About four fifths of the area is forest-covered. Down the rivers float rafts of logs to the saw, pulp, and paper mills along the shores. In the lower river valleys and on the marshlands bordering the Bay of Fundy are hay and potato fields, dairy farms, apple orchards, cranberry and blueberry bogs. In the summer this province is a favorite of sportsmen. They fish for Atlantic silver salmon and trout and hunt the abundant wild game far up the headwaters of the streams.

Extent.—North to south, 230 miles; east to west, 190 miles. Area, 27,985 square miles (512 square miles of fresh water). Population (1951 census), 515,697.

Natural Features.—Coast line 600 miles long, bordered by Chaleur Bay, Gulf of St. Lawrence, Northumberland Strait, Bay of Fundy; Tantramar Marshes at head of Bay of Fundy; Appalachian highlands in northwest; highest point, 2690 feet near Grand Falls on St. John River; lowest point, sea level. Principal rivers; St. John Miramichi, Restigouche, Petitcodiac; Grand Lake. Islands: Grand Manan, Campobello, Deer.

Products.—Potatoes, hay, butter, cheese, condensed milk; coal, sand and gravel, stone; lumber, pulp, paper; fish; ranch furs.

Cities.—Saint John (50,779), Moncton (27,334), Fredericton (capital, 16,018).

The province is square in shape, covering an area of 27,985 square miles. It is bounded on the west by Maine; on the north by the province of Quebec and Chaleur Bay; on the east by the Gulf of St. Lawrence and Northumberland Strait, which separates it from Prince Edward Island; and on the south by a portion of Nova Scotia, Chig-

necto Bay, and the Bay of Fundy. A narrow peninsula only 11½ miles wide joins it to Nova Scotia on the southeast. The Missaquash River is the boundary line across the peninsula.

Much of eastern and central New Brunswick is a lowland plain. In the northwest, outlying spurs of the Appalachian Mountains thrust across New Brunswick from Maine to Quebec. This section is wild and rugged. There are few gaps through these mountains to the St. Lawrence River valley. Hence all the trade routes from earliest settlement have pointed southward to New England and eastward to the other Maritime Provinces. From the commercial and industrial heart of Canada New Brunswick is isolated by mountains, forests, and sea. Two railroads follow the long all-Canadian route north to the Gulf of St. Lawrence, then southwest along the south shore of the St. Lawrence River to Quebec City and Montreal. A shorter and more direct railroad cuts west across the "foreign" state of Maine.

The Bay of Fundy and Its Tides

The Bay of Fundy plays a leading part in the life of the province. It is an inlet of the Atlantic Ocean, between New Brunswick and Nova Scotia, about 180 miles long and 48 miles wide at its mouth. At the upper end it divides into Chignecto Bay and Minas Channel (Nova Scotia). Passamaquoddy Bay on the southwest forms part of the boundary with Maine.

The bay is remarkable for its tides, the highest in the world. In Passamaquoddy Bay they average 25 feet, but at the upper end they often rise 60 feet. As the tide rolls in from the open sea it is confined by the funnel-like shape of the bay. The force of the water as it roars in and out of the many inlets and river mouths twice daily is a most impressive sight.

Most spectacular are the Reversing Falls of St. John and the Moncton Bore. Near its mouth, at the city of St. John, the St. John River drops 26 feet through a gorge 450 feet wide and about 100 feet deep. At low tide the river rushes in whirlpools on its way into the bay. As the tide rises, the ocean forces its way upstream in a wild confusion of churning waters which fall in the opposite direction. The Moncton Bore is a wall of water 3 to 6 feet high, depending on the season. It advances up the narrow estuary of the Petitcodiac River toward the city of Moncton, appearing to leap over the top of the river itself. (For picture, *see* Tide.)

One effect of the silt-laden tides has been the creation of fertile lowlands along the shores of the bay. The rich alluvial soils of the Marshes of Tantramar, near Sackville, cover 50,000 acres. The tides also keep the harbors free of ice, and St. John is one of Canada's chief winter seaports (*see* St. John).

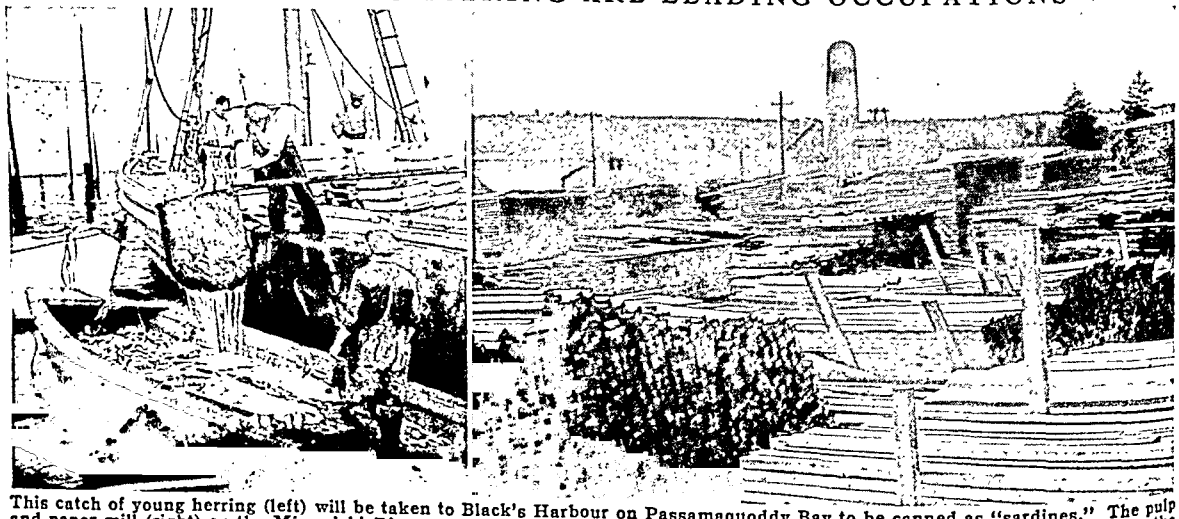
On the Maine border are the Fundy Isles, some 365 islands. Many of them are only rocks reaching out of the sea. Grand Manan is the largest (55 square miles). Campobello and Deer islands are next in size. Many Canadians and residents of the United States have summer homes on these islands. The permanent residents are fishermen.

The Fundy National Park (80 square miles) commands beautiful views of Chignecto Bay in Albert County, in the southeastern part of the province.

Many Long and Beautiful Rivers

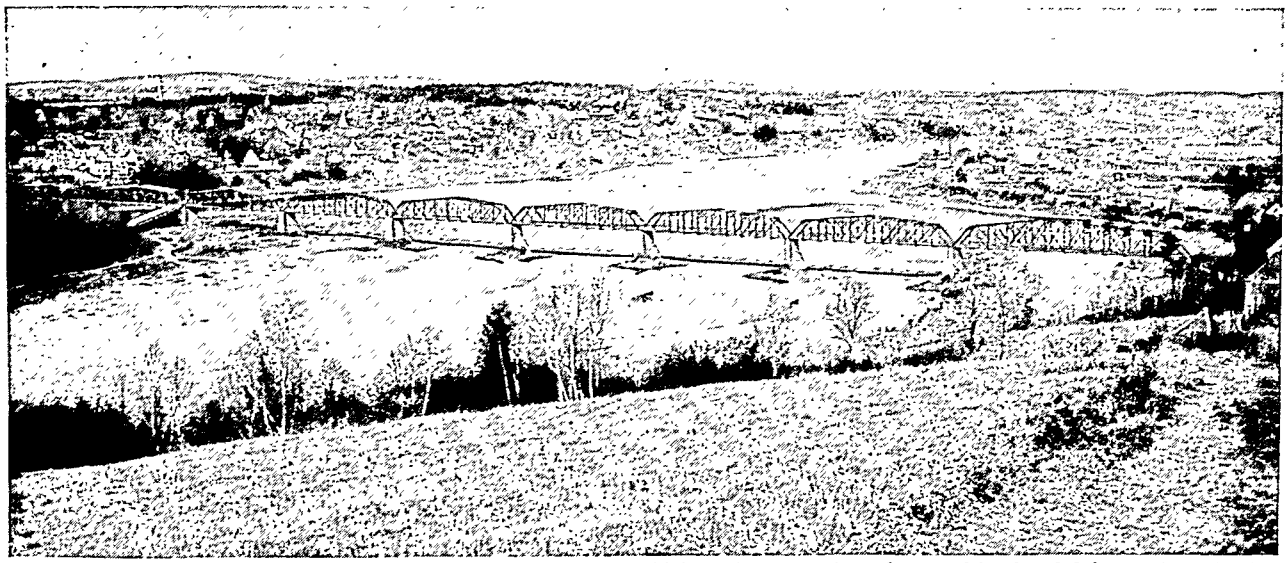
The St. John River is the chief highway into the interior. It rises in the forests of Maine and Quebec and crosses the province from northwest to southeast for 418 miles to empty into the Bay of Fundy. With its many tributaries it drains an area of about 30,000 square miles. On its shores are the city of St. John and, 80 miles upstream, the capital city of Fredericton. At Grand Falls, 225 miles upstream, the river drops 75 feet in a magnificent waterfall. It then falls another 50 feet through a winding gorge about a mile long and 80 to 100 feet deep. A great hydroelectric power plant has been erected at the falls to provide power for distant paper and pulp mills.

FISHING AND LUMBERING ARE LEADING OCCUPATIONS



This catch of young herring (left) will be taken to Black's Harbour on Passamaquoddy Bay to be canned as "sardines." The pulp and paper mill (right) on the Miramichi River near Newcastle is one of several on the banks of the New Brunswick rivers. In the background may be seen the forest which still covers about four fifths of the area of the province.

A SCENE ALONG THE ST. JOHN RIVER



Woodstock, on the St. John River, is the center of farming area which produces potatoes, hay, and beef and dairy cattle. The first settlements of the province were on the banks of this river. For years it was the only highway and means of communication.

Other important streams are the Miramichi River, 135 miles long, which empties into the Gulf of St. Lawrence; the Restigouche River, 100 miles long, which empties into Chaleur Bay; the Petitcodiac River at the north end of the Bay of Fundy; and the St. Croix River along the Maine boundary. The headwaters of all these streams are popular with sportsmen for their salmon and trout and abundant game.

The climate of New Brunswick in general is continental in character. Prevailing winds are from the west, bringing extreme temperatures. Conditions vary with altitude and nearness to the coast. In the northwest highlands, summers are short and frosts may occur in any month. In southern and eastern New Brunswick the climate is milder. Fredericton has a mean temperature of 13.5° F. in January and 66.1° in July. An average year may range from 20 degrees below zero to 100 above. The average precipitation is 40 to 45 inches annually, being heaviest on the Fundy shore. The snowfall totals 105 inches in the interior and in the north and 96 inches at Fredericton.

Fertile River Valleys and Lowlands

About 20 per cent of the total area of New Brunswick is under cultivation. The river valleys of the St. John and Petitcodiac are fertile farming areas. Back of the ridge which parallels the Bay of Fundy, extending southwest from Moncton to the St. John River, is another productive valley. Sussex is its commercial center. At the head of the bay are the Marshes of Tantramar. These lowlands are protected from flooding by a system of dikes, drains, and gates. These works permit the fresh water from the surrounding hills to flow out at low tide and prevent the high salt tide from entering the land. Sackville is the commercial center of this area.

Hay and potatoes are the chief field crops. Dairying has grown rapidly in recent years, and the production of butter, cheese, and condensed milk is an important industry. The "finishing" of beef cattle, shipped in for that purpose from western Canada, and ranch furs (fox and mink), apples, baby chicks, cranberries, blueberries, and maple syrup are other sources of income.

Natural Resources and Manufacturing

A forested area of about 22,000 square miles (80 per cent of its total area) makes lumbering a leading occupation. Logs are hauled over snow roadways in the winter and floated down the rivers during the spring freshets to the mills along their banks. Pulp, paper, and other wood products account for nearly half the gross value of manufactures.

New Brunswick's fisheries rank fourth among the Canadian provinces, following British Columbia, Nova Scotia, and Newfoundland. Lobsters and herring are the most valuable of the many kinds taken.

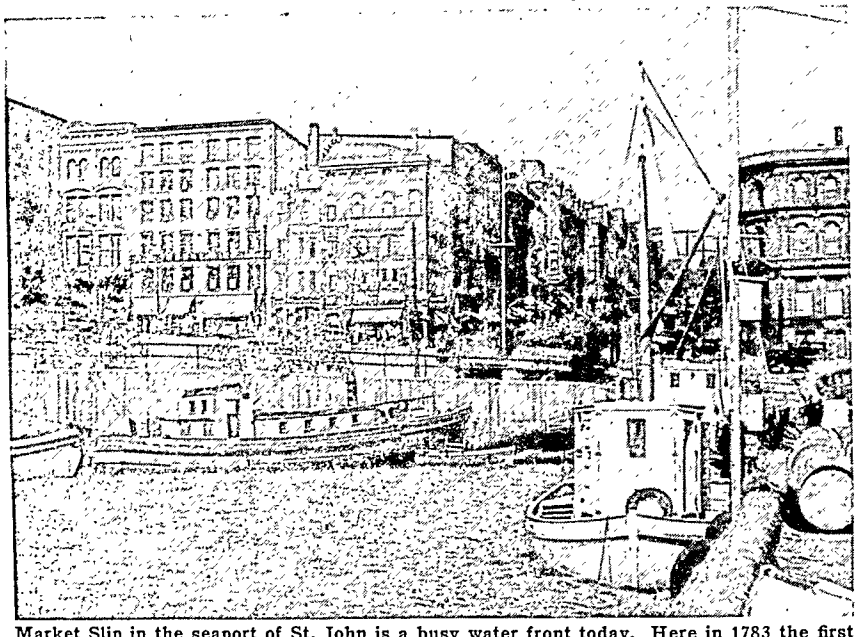
The mineral resources are still little developed. About half the total value of mineral production is coal. Natural gas and petroleum are produced in small quantity, and other minerals include gypsum, rock for the making of grindstones, sand, gravel, peat moss, and clays suitable for brick, tile, and pottery.

Manufacturing depends on the natural resources of the province, with pulp, paper, and wood products far in the lead, followed by canned fish, and dairy products. A revival of artistic home handicrafts has taken place through the leadership of the Cottage Craft Industries. Hooked rugs, hand-woven woolens, pottery, wood, metal, and leather products rank among the finest in the world.

The People, Their Schools, and Government

More than half of New Brunswick's people are of English, Irish, and Scottish descent. About 38 per cent are descendants of original French settlers. The population is about three fifths rural. Some of New Brunswick's famous sons include Andrew Bonar Law, one-time prime minister of Great Britain; Richard B. Bennett, formerly prime minister of Canada; Lord Beaverbrook, British newspaper

MARKET SLIP AT ST. JOHN



Market Slip in the seaport of St. John is a busy water front today. Here in 1783 the first shiploads of United Empire Loyalists landed to found the modern British province.

publisher and capitalist; and the poets Bliss Carman and Sir Charles G. D. Roberts.

A modern school system provides education through high school for every child in the province. The County Schools Finance Act of 1943 provided for a reorganization of rural schools into larger units. By January 1948 the number of administrative units had been reduced from 1,350 to 37. Pupils of grades seven through high school are conveyed by public school busses to the new junior-senior regional Composite High Schools. The schools are open in the evening for adult education classes and community recreation. At the head of the educational system is the University of New Brunswick at Fredericton.

The government is headed by a lieutenant governor appointed by the governor-general of Canada; a prime minister and executive council; and a legislative assembly of 52 members, elected for terms of five years.

Founded by French and British

Jacques Cartier in 1534 was the first white man to land on the shores of New Brunswick, probably at the mouth of the Miramichi River. On June 24, 1604, Samuel de Champlain and the Sieur de Monts discovered the St. John River. They named it in honor of John the Baptist, whose feast day is celebrated on June 24. The region was settled by the French. Together with Nova Scotia it was known as Acadia. In 1755 there were 10,000 French residents. In that year most of the people were exiled by the British, who had obtained possession of Acadia by the Treaty of Utrecht in 1713 (*see* Acadia; Nova Scotia). Many of them later returned, and their descendants now make up about one third of the population.

After the French were expelled the British settled lands in New Brunswick. The Tantramar Marshes were settled by farmers from Connecticut and Massachusetts. In 1765 the region became the county of Sunbury in the province of Nova Scotia.

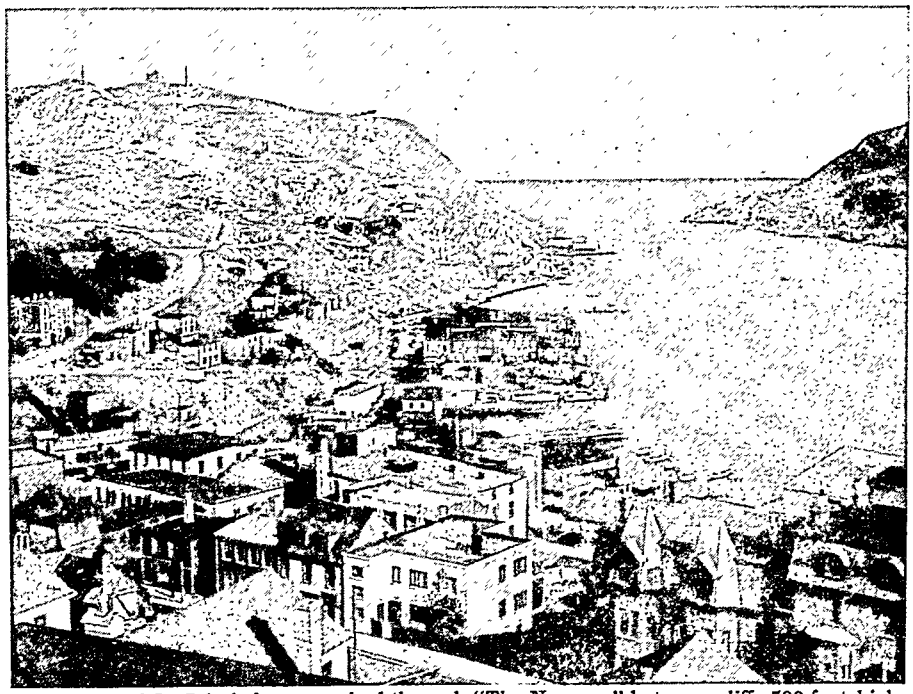
The arrival of the United Empire Loyalists helped to develop the region. These former citizens of the American Colonies remained loyal to Great Britain during the Revolution. In 1783 their property was confiscated by the United States and many emigrated to Canada. On May 18, 1783, 20 vessels disembarked nearly 3,000 people at St. John. The following year another 6,000 arrived. In 1784 New Brunswick was made a separate colony, with Thomas Carleton as the first governor. Fredericton was settled by Loyalists in 1783 where a French village once stood. It was named for the second son of George III. In 1785 it became the capital.

The boundary with Maine was long in dispute. Troops were marshaled but no fighting took place. The "Aroostook War" was settled by Daniel Webster and Lord Ashburton in 1842 (*see* Maine). On July 1, 1867, New Brunswick joined with Nova Scotia, Ontario, and Quebec to form the Dominion of Canada. (For Reference-Outline and Bibliography, *see* Canada; Canadian History.)

NEWCASTLE-UPON-TYNE. ENGLAND. "Carrying coals to Newcastle" is an ironic old saying. We appreciate its meaning when we sail up the narrow crowded waters of the River Tyne and come to this bustling city at whose docks steamers and barges are loading coal for shipment to other places; for Newcastle is in the center of the coal regions of Durham and Northumberland and is one of the most important coal-shipping centers of Europe. The city's shipbuilding yards and locomotive and engineering and ordnance works are among the largest in England. George Stephenson was born near Newcastle and the city was associated with many of the first steps in the development of the railway system. Its factories turn out vast quantities of soda, vitriol, bleaching powder, salt and other chemical products, and also earthenware, cement, grindstones, fire brick, and refined lead. It is also one of the largest fruit and vegetable markets in Great Britain.

Newcastle was the site of an old Roman fort to defend the eastern end of the wall that Hadrian built across Britain. Its modern name of Newcastle came in the 11th century when Robert, the son of William the Conqueror, built a castle there. A century later Henry II erected the castle which is still standing. Its walls are 18 feet thick and its turrets 107 feet high—a fine Norman stronghold. Population (1951 census, preliminary), 291,723.

Where AMERICA *Is* NEAREST *to* EUROPE



The harbor of St. John's is approached through "The Narrows" between cliffs 500 feet high. On Signal Hill (left), Marconi received from England the first wireless message ever sent.

NEWFOUNDLAND. Canada's newest province is Newfoundland. It comprises the island of Newfoundland and Labrador on the mainland of northeastern Canada. After 450 years as a separate member of the British Empire, the island, together with Labrador, became the tenth province of Canada, March 31, 1949.

The rocky island at the mouth of the Gulf of St. Lawrence was the first land discovered by John Cabot in the New World (1497). The island is separated from Nova Scotia on the southwest by the 70-mile-wide Cabot Strait. The narrow Strait of Belle Isle, only 10 to 15 miles wide, separates it from Labrador. The area of the island is 42,734 square miles, about the size of Ohio. Labrador covers 112,630 square miles. (*See* Labrador; for map, *see* Canada.)

Because Newfoundland is the nearest point of North America to the British Isles (about 1,940 miles to Ireland), it is important as the terminus of cable and airplane routes and as an outpost of Canadian and United States defense. The Gander Airport on the north coast of the island is one of the largest in the British Empire. Goose Bay Airport in Labrador is also important. The United States uses these fields in exchange for Canadian rights to fly across United States territory. Other naval and air bases and an army post near the capital, St. John's, were leased by the United States for 99 years in 1941.

Even before the day of the airplane, Newfoundland was an important communications center. The first Atlantic cable was laid in 1858 between Newfoundland and Ireland, and the first wireless message was sent in 1901 from England to Newfoundland. Bay Roberts is a relay station of the present Atlantic cables.

The island of Newfoundland has a deeply indented coast line, some 6,000 miles long. Almost all Newfoundland's people live close to the sea, on the shores of deep coves and bays. The interior is a plateau, crossed by low ridges which reach their greatest elevation (over 2,500 feet) on the west coast in the Anguille and Long ranges. A network of rivers and lakes drains the interior in a northeast or southwest direction. The Humber, Exploits, and Gander are the longest rivers, all of them flowing out of and through large lakes. The broad river valleys and the west coast are heavily forested. Fur-bearing and large game animals are abundant, and great numbers of ducks, geese, and other water birds nest on the island. This is the home too of the gentle Newfoundland dog.

Labrador's few people live in small villages on the barren coast. Inland are deep forests where a few scattered Indians live. Almost all Labrador is drained by the great Hamilton River, famous for its beautiful Grand Falls. (*See also* Labrador.)

The climate of the island varies considerably. On the west coast it is clear and sunny both winter and summer. In the southeast it is damp and foggy most of the year. The fogs are caused by warm moist winds blowing off the Gulf Stream and mixing with cold air over the Labrador Current from the Arctic Ocean. Winters may last from November to May, but the temperature seldom falls below zero. In St. John's the temperature usually ranges from 10° F. in January to an extreme of 80° in July. Labrador has a far more severe, sub-Arctic climate.

John Cabot and his son Sebastian found that the waters of Newfoundland teemed with codfish. Their enthusiastic reports first drew Englishmen across the ocean. The abundance of fish is due chiefly to the great submarine plateau called the Newfoundland Banks, or Grand Banks. This plateau extends about 300 miles off shore and comes within 100 or 200 feet of the surface. The cold Labrador Current and

Extent.—Total area, 155,364 square miles: Labrador, 112,630 square miles; island, 42,734 square miles. Population (1951 census), 361,416: island, 353,526; Labrador, 7,890.

Natural Features.—Coasts broken by fjords and island-dotted bays; Anguille Range and Long Range mountains in the west of the island, and isolated peaks (highest point, Lewis Hills, 2,673 feet, in Long Range; lowest point, sea level). Highest point in Labrador, Cirque Mountain (5,500 feet); lowest point, sea level. Chief rivers: island—Humber, Exploits, and Gander; Labrador—Hamilton. Grand Falls, 245 feet, on Hamilton River.

Products.—Codfish, herring, lobster, salmon; iron, lead, zinc, copper, fluorspar, limestone; pulp and paper; sealskins and other furs; dairy products; hay, potatoes, eggs, turnips; livestock.

Cities.—St. John's (capital, 52,873); Corner Brook (10,276).

the warm Gulf Stream meet over the Banks. Laden with the microscopic food, plankton, on which fish feed, they attract and support myriads of fish. After four centuries, the Banks are still the world's greatest codfishing grounds. Herring, salmon, lobster, and other species also abound. Seal hunting is carried on in late winter when ice floes carry the seals down from the Arctic. Whales are also taken.

The manufacture of pulp and paper, chiefly newsprint, is a new and rapidly growing industry. Its products now rival those of the fisheries in value. Corner Brook, at the mouth of the Humber River, has the world's largest single mill producing newsprint and sulfite pulp. Grand Falls, on the Exploits River, is also an important mill town. The great forests of spruce and fir provide the raw materials, and there is abundant water power to operate the mills.

Minerals on the island include a rich iron mine at Bell Island; lead, zinc, and copper deposits at Buchans; limestone and fluorspar. In Labrador, on the Quebec border, one of the world's largest iron ranges is being opened up for development.

Agriculture is not important. There is little fertile land, and the short, cool growing season limits crop production. The Codroy and Humber river valleys are the chief farming areas, but they are handicapped by lack of roads. Frozen blueberries and fruits are exported.

The airplane is Newfoundland's chief means of communication with the outside world. There is steamship service between St. John's and Halifax, Boston, New York, and Liverpool; and between Sydney, Nova Scotia, and Port aux Basques on the southwest corner of the island. A government coastal steamer serves the fishing towns along the coasts of the island and Labrador in the summer. A government-owned railway runs in a half circle from St. John's on the southeast, past Gander Airport and the paper-mill towns of Grand Falls and Corner Brook to Port aux Basques. Highways in the interior of the island are under construction. Labrador has no inland transportation except the canoe.

The population of the island is 353,526. Labrador has only 7,890 people. Most of the people are of English, Irish, or Scottish descent. About 40 per cent of the total live in the Avalon Peninsula at the southeastern corner of the island. Here is St. John's, the capital (population, 52,873).

Schools are controlled by the churches of various denominations, but the Department of Education pays an annual grant for operating costs. Because of the small and widely scattered towns, about 90 per cent are one- or two-room schools. A few have united to form "amalgamated schools." Secondary schools are found only in the larger towns. The Memorial University College was founded by the government in St. John's as a national war memorial. It offers a four-year course in arts and two-year premedical and science courses.

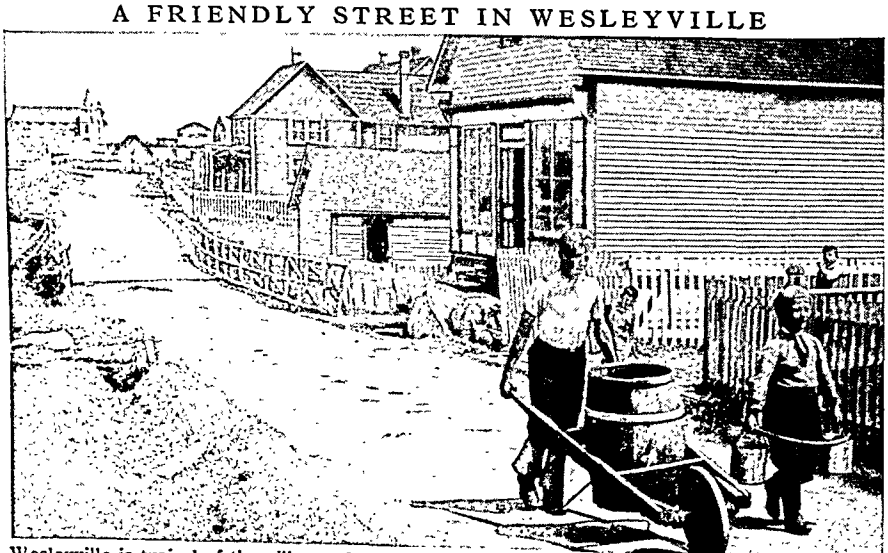
A Long History of Independence

After its discovery by John Cabot, Newfoundland was used only as a fishing station. In 1583 Sir Humphrey Gilbert took possession of the island in the name of Queen Elizabeth I. The French, who held Canada, had long attempted to control Newfoundland. Though the Treaty of Utrecht in 1713 recognized the sovereignty of Great Britain, France was given the right to catch and dry fish on the northern and western shores. These rights in the "French shore" were retained by France until 1904, when it gave them up in return for concessions in Africa.

Newfoundland was long governed by the "fishing admirals," the masters of the earliest fishing vessels to arrive on the Banks in the spring. In 1729 the first governor was appointed by the British Parliament. The island was a colony until 1855. In that year it was made a self-governing dominion, and Labrador became a dependency. The Labrador-Quebec boundary was not defined until 1927.

In 1934 the world-wide business depression brought financial ruin. Newfoundland was forced to give up its independence and accept a commission form of government appointed by the British Parliament. In 1948 Newfoundland, rather than return to dominion status, voted to join Canada as the tenth province, effective March 31, 1949. (For Reference-Outline and Bibliography, *see* Canada; Canadian History.)

A FRIENDLY STREET IN WESLEYVILLE



Wesleyville is typical of the villages that dot the Newfoundland coast. The houses are of wood and stand close to the narrow street. Notice the rocks and the absence of trees. The boys are carrying home the day's supply of drinking water. There are few wells in the town.

LAND *of* HEAD-HUNTERS *and* TREE-DWELLERS



American troops march along this New Guinea beach during the second World War. In spite of the many bloody battles fought here the conflict left little imprint on the land and its people. Most of the fighting took place along narrow fringes of the coast and did not penetrate the vast interior.

NEW GUINEA. The vast island of New Guinea—second largest on earth—still keeps many of its secrets hidden. Most of its 300,000 square miles is occupied only by natives. Some are head-hunters.

New Guinea lies north of Australia, across the Torres Strait and just below the equator (for map, *see* East Indies). It stretches some 1,500 miles east to west and is about 450 miles across at its widest. The only island that has a greater area is Greenland.

The eastern half of New Guinea is ruled by Australia. It governs Northeast New Guinea as a trusteeship and Papua as a British dependency. Beginning in 1949 the Netherlands and Indonesia disputed over west New Guinea. Population of New Guinea and nearby islands, 2,476,224, including Papua, 375,966 (1952 est.); Northeast New Guinea, 1,100,258 (1952 est.); west New Guinea, 1,000,000 (1949 est.).

In the Interior of the Great Island

A backbone of mountains with snow-clad peaks higher than any in the United States runs nearly the entire length of the island. Rugged spurs extend from this backbone, cutting up the land into deep valleys and isolated plateaus. Great rivers flow down from the mountains, crossing broad belts of forest and swamplands to the sea. The most important river is the Fly, which winds 800 miles southward to the Gulf of Papua; next are the Sepik and the Mamberamo, which empty into the Pacific Ocean on the north. Lakes nestle in hills and valleys or form chains in the lowlands along the rivers. Where mountain spurs reach the sea, the coast is high and rocky; elsewhere it consists mostly of tidal swamps.

In the rainy seasons, terrific storms sweep the island. In the lowlands even the dry seasons are damp enough for the giant grasses and the dense forests to continue their lush growth. Acacias, eucalyptus, cypress, and palms of many kinds grow here. Among their branches cling hundreds of varieties of rare orchids. Great creepers and climbing vines form a tangle so dense that explorers who leave the rivers to cut their way through the forests count two or three miles a day a fair rate of travel. Clouds of mosquitoes hover above water teeming with crocodiles and huge leeches. Brilliantly colored butterflies flutter among the tree tops. The wild life resembles that of Australia, including egg-laying mammals called "spiny anteaters," and several marsupials such as the wallaby (a miniature kangaroo), the ring-tailed opossum, the bandicoot, and the wild pig. Huge fruit-eating bats abound. Conspicuous among the birds are the ostrich-like cassowary, so powerful that it can kill a dog with a blow of its foot, the egret, the bowerbird, and the many species of birds of paradise. Lizards, some of great size, and snakes both harmless and poisonous exist nearly everywhere on the island. In the coastal waters live the strange sea mammals called dugongs and numerous great turtles.

The People of New Guinea

From district to district and from tribe to tribe the natives of New Guinea show an amazing contrast in appearance, customs, and language. Some are as black as Negroes; others are no darker than a well-tanned white man. Some are six-foot giants; other, dwarf-like pigmies. A tribe with broad noses and thick lips may have long-nosed and thin-lipped neighbors. There are small groups that live like hunted animals without settled homes and with no more possessions

LIKE THE NESTS OF GIANT BIRDS



Tree houses like these, built of interwoven sticks and covered with long grass, are common on the New Guinea coast. They serve as refuges from unfriendly neighbors and as dwellings for the unmarried girls of the tribe. The ladders may be pulled "upstairs" as added protection.

than they can carry on their backs. There are also great tribes with an elaborate social organization and a remarkable skill in architecture, boat-building, sculpture, painting, weaving, and pottery-making. Measured on the scale of the history of white civilization, the culture of the New Guinea natives ranges from that of the "dawn men" of Europe to that of the lake dwellers of Neolithic times (*see* Man).

The best-known of the natives belong to the so-called "Papuan" types. They are sooty brown to deep black, with long frizzly hair. Many of the Papuans have oval faces with prominent noses, high cheekbones, and high foreheads. The men are nearly naked; their bodies are decorated with knife scars in intricate pattern, made when they graduate from boyhood. They wear necklaces of teeth and shells, earrings, feathered headpieces, and cassowary bones thrust crosswise through the middle cartilage of the nose. The women generally wear grass skirts and much simpler ornaments than the men.

The typical Papuan village lies near a river bank, hidden behind a screen of trees. The buildings are well made of log frames with thatched walls and roofs. Near the river are concealed the great war canoes skilfully hollowed out of huge tree trunks with axes and adzes made of stone or shell. Gardens fringe the village where the women raise yams, taro, bananas, and sugar cane. Other food comes from the sago palms and breadfruit trees in the near-by forest.

The family houses surround a long clubhouse and armory, called a *dubu*, strictly reserved for men. In front of the dubu is an open space where the wild tribal song-dances are held to the intricate rhythms of drums. Inside the dubu hang marvelously carved and painted canoe paddles, bows and arrows, spears, and daggers made from cassowary bones and human shinbones. Most prized of all are the exhibits of human skulls and smoked heads, each one representing a victim killed and perhaps eaten. Cannibalism and head-hunting have stopped near the coast, but they persist in remote areas.

The White Man in New Guinea

Portuguese and Spanish adventurers of the early 16th century were probably the first white men to sight the coast of New Guinea. In 1606, a Spaniard, Luis de

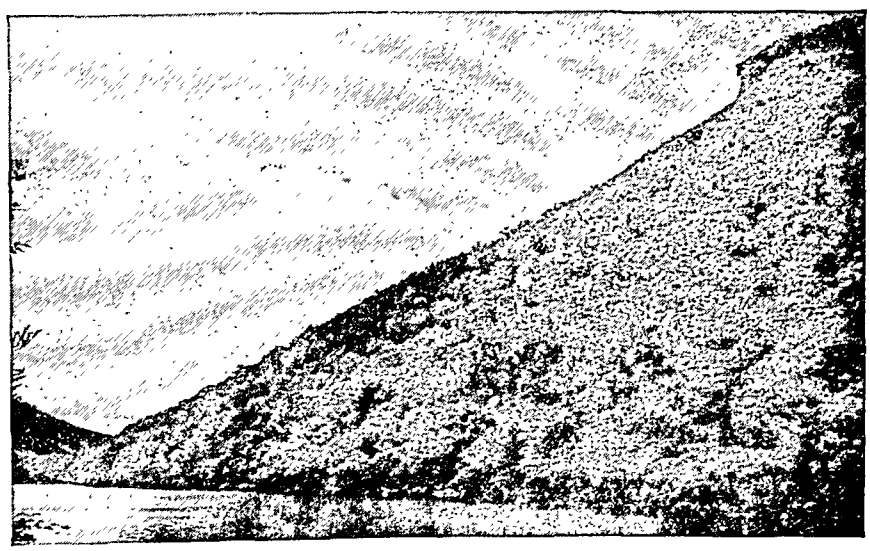
Torres, sailed the strait between New Guinea and Australia which bears his name. The Dutch annexed the western half of the island in 1793, and Germany and Great Britain set up protectorates in the eastern half in 1884. British New Guinea passed into Australian control as the Territory of Papua in 1906, and German New Guinea (Kaiser Wilhelm's Land) went to Australia, first as a League of Nations mandate and later as a trusteeship under the United Nations.

The chief resources of New Guinea are copra, rubber, and sisal hemp raised on plantations under European direction. Most of the plantations, however, were ruined by neglect during World War II. The forests are rich in valuable timber, largely unexploited. Petroleum has been found in several regions. The mountains, young and rugged like the Rockies, promise vast deposits of minerals and are already yielding some gold, copper, silver, and osmiridium. But tangled jungles and jagged cliffs bar the way to mineral wealth. Airplanes are often used to transport machinery and supplies to mines in the interior.

This wilderness halted the Japanese after they had landed at Lae, Salamaua, and Buna in 1942 in World War II. The delay enabled American and Australian forces to hack their way over the Owen Stanley Mountains and repel the invaders (*see* World War, Second).

Netherlands, or Dutch, New Guinea consists of the western half of New Guinea and offshore islands, chiefly the Japan and Schouten groups, Frederik Hendrik, and Salawati. The territory's area is 150,000 square miles, and its capital is Hollandia. The Territory of New Guinea, under Australian trusteeship, embraces 93,000 square miles. It is made up of northeastern New Guinea, the Bismarck Archipelago (including New Britain, New Ireland, and the Admiralty Islands), and the northern Solomon Islands (including Buka and Bougainville). The Territory of Papua, also governed by Australia, is 90,540 square miles in area. It comprises southeastern New Guinea, Louisiade Archipelago, D'Entrecasteaux Islands, Woodlark Island, and Trobriand Islands. Port Moresby is the capital of both Australian territories.

The "GRANITE STATE"



The "Old Man of the Mountains," about which Hawthorne wrote his famous story, juts out against the sky. From its high place on the cliffs bordering Franconia Notch in the White Mountains, it overlooks a picturesque valley and lake region.

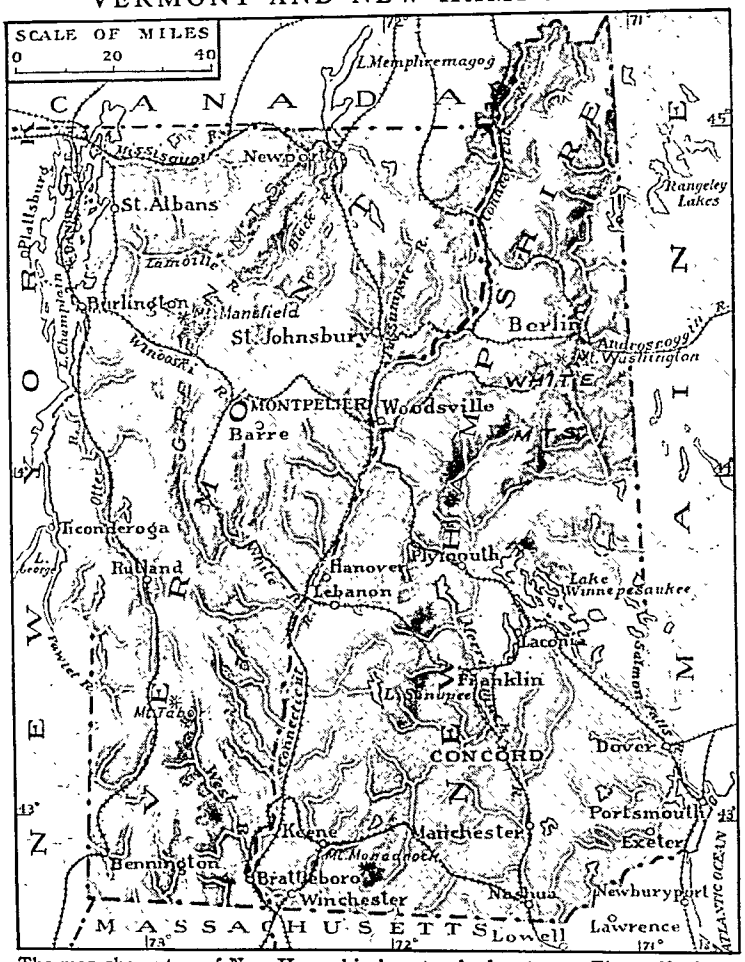
NEW HAMPSHIRE. Many people think of New Hampshire, "the granite state," chiefly as a playground. Indeed much of the state resembles a vast and beautiful park, made up of mountains, lakes, and valleys. Here are cool summer breezes, fine hotels, good highways, and mountains of varying heights for climbers. Here the bare summits of the tallest peaks overtop the pines, spruces, and hemlocks, which cloak mountainsides and valleys. In winter, snow-clad slopes draw devotees of skiing and tobogganing.

About half of New Hampshire is mountainous, with ranges and wilderness covering much of the western and northern parts of the state. In the southwest are a number of low mountain ranges. Their highest peak (3,166 feet above sea level) is Mount Monadnock, to which Emerson referred in some of his poems. The northern section has the lovely White Mountains. They extend across the state from the Connecticut River valley into Maine.

One of the most picturesque spots in New Hampshire is Franconia Notch. This wooded gap, about five miles long, cuts through the southwestern group of the White Mountains. The notch is dominated by Profile Mountain. Its upper cliffs form the "Old Man of the Mountains," made famous by Nathaniel Hawthorne's story, 'The Great Stone Face'.

About 20 miles eastward by air and 50 miles by highway from Profile Mountain is Mount Washington, also in the White Mountains. This peak (6,288 feet above sea level) towers higher than any other in New England and is among the highest of all the mountains east of the Mississippi River. A foot trail, a cog railway, and a highway all lead to the summit of Mount Washington. From there on a clear day a visitor can see parts of Vermont and New York, Maine, Canada, and the Atlantic Ocean. On the summit is an important United States Weather Bureau station which is open the year around.

VERMONT AND NEW HAMPSHIRE



The map shows two of New Hampshire's natural advantages. The swift rivers furnish abundant power for manufacturing; the mountains attract vacationists.

About 10 per cent of New Hampshire's area is included in the White Mountain National Forest. Most of this extensive region is owned by the federal government. The United States Forest Service protects the trees against wasteful logging and forest fires.

A Summer and Winter Playground

The most popular recreational area of New Hampshire is the White Mountain region. The summer tourist season is short but very busy. Families drive along winding and scenic highways, stop to enjoy outstanding views, and stay overnight at hotels, lodges, and tourist camps. Hardier visitors hike over well-marked mountain trails and spend the nights in cabins or shelters. These were erected by the government or by such groups as the Appalachian Mountain Club.

In the White Mountains the long winter season is of importance as a tourist attraction. When the snow is right for skiing, special trains bring thousands of week-end visitors to the area. During the winter season also many hunters come to shoot deer and small game.

In the eastern part of the state are many lakes. The largest of these, Lake Winnepesaukee, is about 22 miles long. Lining its shores and those of smaller lakes are a few towns and many cottages and hotels. Visitors throng here for vacation-time fishing, boating, and swimming.

The state has a number of scenic roads through mountain and river country. The New Hampshire Turnpike, paralleling the ocean inland, speeds traffic between the Massachusetts and Maine borders. Under construction are a branch of this toll road between Portsmouth and Rochester and Everett Turnpike between Nashua and Concord.

Farming, Forestry, and Fishing

The bottom lands of the Connecticut and Merrimack rivers and southeastern New Hampshire have fertile soil. Here are grown the state's chief farm products—milk, eggs, hay, and chickens.

Once a lumber center, about four fifths of New Hampshire is still forested. Its forests even today provide its sawmills and paper and pulp mills with logs.

New Hampshire has the shortest coast line of all the Atlantic states—about 18 miles long. It has only one port, Portsmouth, on the Piscataqua River a few miles from the ocean. The city's fisheries catch lobster, cod, clams, white hake, haddock, and smelt. In Portsmouth is a United States Navy Yard. In this city the peace treaty between Japan and Russia was signed in 1905.

Manufacturing Is Important

New Hampshire's farms, forests, and fisheries provide employment for only a small part of the state's working population. Manufacturing is the leading occupation, both in number of workers and in income. Although the state is 44th in population, it ranks much higher in the value added to goods by its mills and factories. Its largest industry is the manufacture of textiles. In this it is one of the most productive states in the nation. Woolen, cotton, and rayon fabrics account for most of this output. New Hampshire ranks among the leading states in the production of leather and leather goods. The principal manufacture in this group is shoes. Other industries are paper products and machinery.

Hydroelectric power is supplied by the Connecticut River, which forms the state's western boundary, and by the Merrimack River, which flows through the center of the state. The Merrimack provides power to turn more textile spindles than any other river.

The manufacturing industries of New Hampshire are concentrated in about ten relatively small cities. The largest of these is Manchester, in the southern part of the state. Many of the workers in its large shoe and textile factories are French Canadians whose forefathers came here from Quebec in the 19th century to find work in these industries. Nashua, 15 miles south, is also an industrial city. It is at the junction of the Merrimack and Nashua rivers.

Continued on page 154

New Hampshire Fact Summary

NEW HAMPSHIRE (N. H.): Named by Capt. John Mason who came from Portsmouth in Hampshire, England. **Nickname:** "Granite State," from numerous granite quarries. "Mother of Rivers," because sources of 5 important New England rivers are found in mountains of the state.

Seal: The frigate *Raleigh* in foreground; rising sun in background; laurel wreath encircles this scene.

Motto: Live Free or Die.

Flag: For description and illustration, *see* Flags.

Flower: Purple lilac. **Bird** (unofficial): Chickadee. **Tree:** White birch. **Song** (unofficial): 'Old New Hampshire'—words, J. F. Holmes; music, Maurice Hoffmann.

THE GOVERNMENT



Capital: Concord (since 1808).

Representation in Congress: Senate, 2; House of Representatives, 2. Electoral votes, 4.

General Court: Senators, 24; term, 2 years. Representatives, at least 350 and not more than 400 (399 in 1951); term, 2 years. Convenes the first Wednesday in January in the odd-numbered years. No limit to length of sessions.

Constitution: Adopted 1784. Every 7 years, if majority of voters at popular election wish a revision, General Court calls a constitutional convention for that purpose. Ratification requires two-thirds majority voting on subject at a popular election.

Governor: Term, 2 years. May succeed himself. Has council of 5 members, elected every 2 years.

Other Executive Officers: Secretary of state, treasurer, commissary-general, all elected by the legislature; terms, 2 years. Attorney general appointed by governor and council; term, 5 years.

Judiciary: Supreme court—5 justices. Superior courts—6 justices. Probate courts—1 in each county. All judges appointed by governor and council; term, until 70 years of age.

County: 10 counties, each governed by a board of 3 commissioners. Boards and officers elected; term, 2 years.

Municipal: Cities—officials elected as charters provide; towns—board of 3 selectmen, 1 elected each year; terms, 3 yrs.; some towns have town manager.

Voting Qualifications: Age, 21; residence in state, 6 months; in district, 6 months. Literacy test required.



TRANSPORTATION AND COMMUNICATION

Transportation: Railroads, 900 miles. First railroad, Nashua and Lowell (from Lowell to Nashua), 1838. Rural roads, 12,600 miles. Airports, 34.

Communication: Periodicals, 22. Newspapers, 54. First newspaper, *New Hampshire Gazette*, Portsmouth, 1756. Radio stations (AM and FM), 17; first station, WKAV (the present WLNH), Laconia, licensed Aug. 22, 1922. Television stations, none. Telephones, 161,500. Post offices, 333.

THE PEOPLE AND THEIR LAND

Population (1950 census): 533,242 (rank among 48 states —44th); urban, 57.5%; rural, 42.5%. Density: 59.1 persons per square mile (rank—23d state).

Extent: Area, 9,304 square miles, including 287 square miles of water surface (43d state in size).

Elevation: Highest, Mount Washington, 6,288 feet, near Crawford House; lowest, sea level.

Temperature (°F.): Average—annual, 44°; winter, 21°; spring, 42°; summer, 66°; fall, 47°. Lowest recorded, —46° (Pittsburg, Jan. 28, 1925—lower temperatures have been observed on Mount Washington); highest recorded, 106° (Nashua, July 4, 1911).

Precipitation: Average (inches)—annual, 40; winter, 9; spring, 10; summer, 11; fall, 10. Varies from about 35 inches in north central to about 59 inches in south.

Natural Features: White Mountains in northern section; Mount Monadnock in the southwest; lake district in central portion contains Lake Winnipesaukee and many smaller lakes; the Connecticut River with its fertile valley forms western boundary; the Merrimack River flows down through the central southern portion; low country in southeast near the seacoast.

Land Use: Cropland, 6%; nonforested pasture, 4%; forest, 84%; other (roads, parks, game refuges, wasteland, cities, etc.), 6%.



Natural Resources: *Agricultural*—fertile river valleys; land suitable for raising cattle. *Industrial*—forests on mountain slopes supply wood-using industries; mica, feldspar, sand and gravel, clays, stone, and beryllium. *Commercial*—water power from rivers; vacation land.

OCCUPATIONS AND PRODUCTS

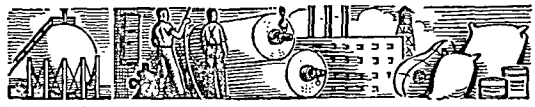
What the People Do to Earn a Living



Major Industries and Occupations, 1950

Fields of Employment	Number Employed	Percentage of Total Employed
Manufacturing	81,884	40.4
Wholesale and retail trade	31,971	15.8
Professional services (medical, legal, educational, etc.)	18,343	9.1
Agriculture, forestry, and fishery	13,625	6.7
Construction	12,260	6.0
Personal services (hotel, domestic, laundering, etc.)	11,792	5.8
Transportation, communication, and other public utilities	11,636	5.7
Government	7,029	3.5
Business and repair services	5,071	2.5
Finance, insurance, and real estate	5,054	2.5
Amusement, recreation, and related services	1,584	0.8
Mining	188	0.1
Workers not accounted for	2,244	1.1
Total employed	202,681	100.0

New Hampshire Fact Summary



What the People Produce

A. Manufactured Goods (Rank among states—33d)
Value added by manufacture* (1952), $413,181,000

Leading Industries in 1947 (with Principal Products)	Value Added by Manufacture	Rank among States
TEXTILE MILL PRODUCTS..... Cotton and rayon fabrics; woolen and worsted fabrics	$85,318,000	14
LEATHER AND LEATHER PRODUCTS. Footwear, except rubber	70,107,000	7
PAPER AND ALLIED PRODUCTS..... Pulp, paper, and paperboard mills	33,520,000	26
MACHINERY (EXCEPT ELECTRICAL).. Special-industry machinery	32,209,000	20
LUMBER AND PRODUCTS..... Sawmills; wooden boxes	22,447,000	30
PRINTING AND PUBLISHING.....	10,960,000	34

*For explanation of value added by manufacture, *see* Census.



B. Farm Products (Rank among states—46th)
Total cash income (1952), $70,646,000

Products	Amount Produced (10-Year Average)	Rank within State*	Rank among States†
Milk.....	160,000,000 qts.	1	42
Eggs.....	29,000,000 doz.	2	36
Hay.....	430,000 tons	3	43
Chickens.....	28,921,000 lbs.	4	37

*Rank in dollar value †Rank in units produced



. Minerals (Fuels, Metals, and Stone)
Annual value (1951), $1,296,000
Rank among states—46th

Minerals (1951)	Amount Produced	Value
Sand and gravel....	2,260,000 tons	$518,000
Feldspar*.....	.....	.....
Stone.....	62,000 tons	350,000

*Feldspar ranks 2d in value; exact figures not available.

D. Trade

Trade (1948)	Sales	Rank among States
Wholesale.....	$188,998,000	45
Retail.....	470,742,000	44
Service.....	50,757,000	40

LARGEST CITIES (1950 census)

Manchester (82,732): important industrial center; manufactures shoes, textiles, electrical equipment, cigars.
Nashua (34,669): water power; shoes, cloth, paper and wood products, machinery, electronics equipment.
Concord (27,988): state capital on Merrimack River; railroad shops; magazine printing; granite works; textiles.
Portsmouth (18,830): Atlantic port; naval base; fisheries.
Berlin (16,615): paper, pulp, and allied products.
Dover (15,874): shoes, printing machinery, fiber products.
Keene (15,638): industrial and resort city; machinery.
Laconia (14,745): resort and industrial city; hosiery mills.

EDUCATION



Public Schools: Elementary, 453; secondary, 93. Compulsory school age, 6 through 16. State Board of Education consists of governor and 7 nonsalaried members, appointed by governor, 5-year terms. Commissioner of education appointed, indefinite term. District and union school board members elected, 3-year terms. Local superintendents nominated by supervisory union board, appointed by State Board of Education, 1- to 7-year terms.
Private and Parochial Schools: 137.
Colleges and Universities (accredited): Colleges, 10; junior college, 1. State-supported schools include the University of New Hampshire, Durham; 2 teachers colleges—Keene and Plymouth; 2 state technical institutes—Manchester and Portsmouth.
Special State Institution: Laconia State School, Laconia.
Libraries: City and town public libraries, 238. State library responsible for aid in developing library service, operating bookmobile service in all ten counties.
Outstanding Museums: Currier Gallery of Art, Manchester; Dartmouth College Museum, Hanover.

CORRECTIONAL AND PENAL INSTITUTIONS

Industrial School, Manchester; State Prison, Concord.

PLACES OF INTEREST*

Belknap Mountains Recreation Area—Gilford; summer and winter sports; lake and mountain scenery (32).
Benson's Wild Animal Farm—near Hudson; jungle animals' training camp for circus or zoo life (60).
Cathedral of the Pines—Rindge; outdoor altar in grove of pines, a memorial to World War II dead (59).
Chinook Kennels—Wonalancet; village of Huskies (20).
Collins Clock Museum—near Georges Mills; over 300 rare clocks; historic carvings on 13-foot clock (34).
Concord—Statehouse built in 1819 (*see* Concord) (43).
Daniel Webster Birthplace—near Franklin (35).
Dixville Notch—unusual rock formations (2).
Dover—early settlement founded in 1623 (44).
Durham—home of Maj. Gen. John Sullivan of the Revolutionary War; church was storage place for powder and arms used at battle of Bunker Hill (49).
Exeter—capital of New Hampshire during Revolution; Phillips Exeter Academy (51).
Franklin Pierce Homestead—Hillsboro; home of the fourteenth president of the United States (45).
Glen Ellis Falls—at Pinkham Notch on Ellis R. (10).
Goyette Museum of Americana—Peterborough; reconstructed old shops on a typical, early village street (56).
Hannah Dustin Monument—Penacook; site where heroine in 1697 scalped her Indian captors; west of (43).
Horace Greeley Marker—Amherst; honors author of famous saying, "Go West, young man"; n.w. of (60).
Indian Head—rock profile on Mt. Pemigewasset (15).
Lake Winnipesaukee—state's largest lake (30).
Libby Museum—Wolfeboro; mounted birds, fish, and snakes in replicas of natural habitats (31).
Lost River—rock formations near Kinsman Notch (16).
MacDowell Colony—Peterborough; haven for authors, artists, and musicians since early 1900's (56).
Morse Museum—Warren; displays of mounted animals, weapons from all over the world; shoe collection (21).
Mt. Washington—3-mile cog railway and 8-mile scenic toll road to mountaintop; United States Weather Station (9).

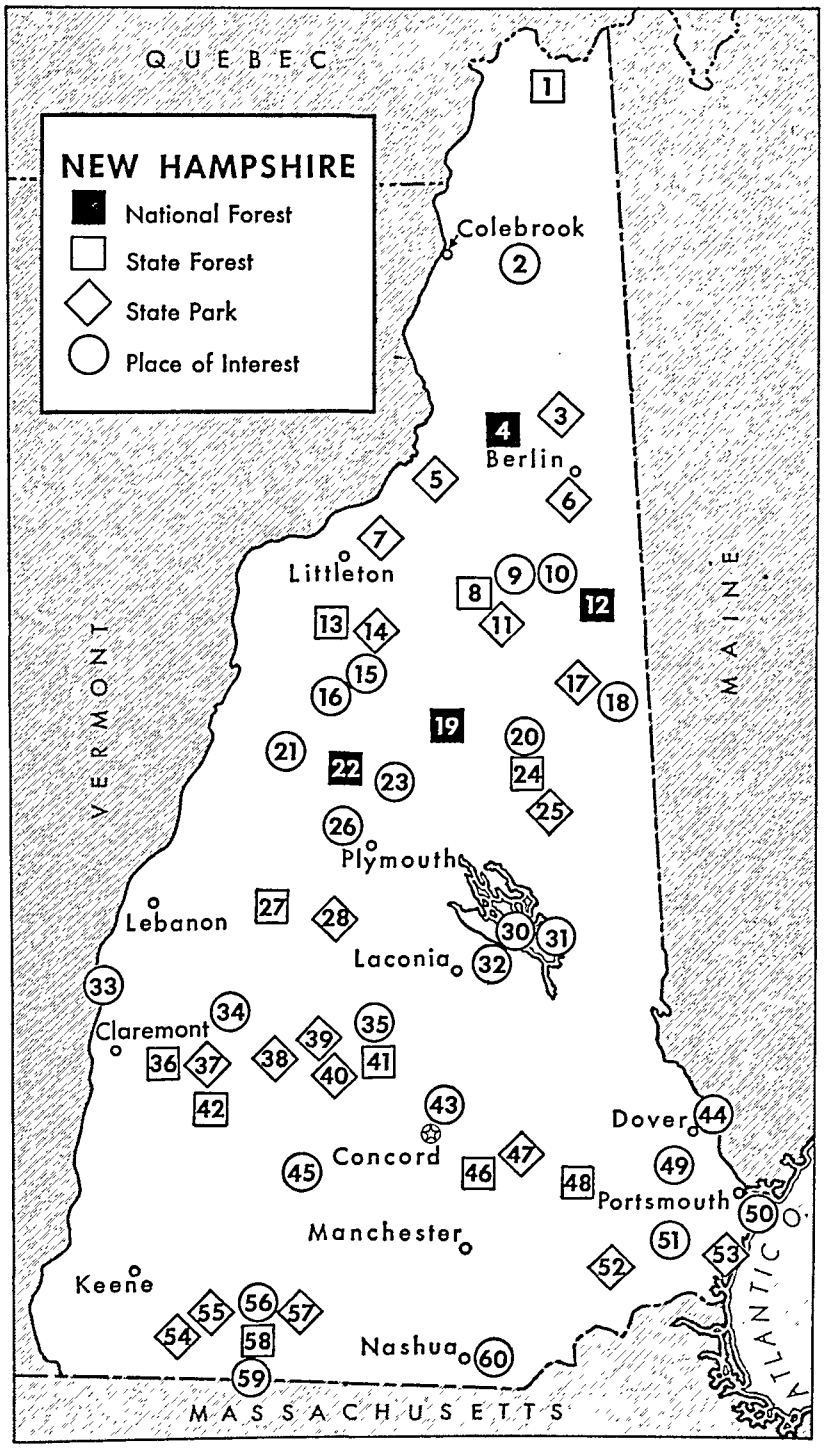
*Numbers in parentheses are keyed to map.

New Hampshire Fact Summary

Polar Caves—near Plymouth; cold, rocky caverns and passageways (26).
Portsmouth—U. S. Navy Yard; colonial capital (1623); historic houses (50).
Saint-Gaudens Memorial — Cornish; sculptor's home and studio (33).
Skimobile—North Conway; ride up Cranmore Mt. in miniature cars (18).
White Mountain Glacial Park—Thornton; potholes; 75-ft. Rainbow Falls (23).

STATE PARKS*†

Bear Brook—trails, lakes, streams (47).
Cardigan—on Mt. Cardigan; picnicking, hiking; scenic views; at symbol (27).
Clough Reservation—quiet picnic area; southeast of (45).
Crawford Notch—scenic splendors; waterfalls, cascades, cliffs (11).
Echo Lake—scenery of Cathedral, White Horse ledges; swimming (17).
Forest Lake—swimming, picnicking (7).
Franconia Notch—scenic White Mt. area; "Old Man of the Mountains" on Profile Mt.; Flume Gorge; Cannon Mt. Aerial Tramway; potholes (14).
Hampton Beach—on Atlantic Ocean (53).
Hilton—picnic spot overlooks Great Bay and tidal mouth of Piscataqua River; east of (49).
Kingston Lake—picnicking; beach (52).
Milan Hill—scenic views toward White Mts. into Me., Vt., Canada (3).
Miller—on Pack Monadnock Mt.; hiking trails; forest fire lookout (57).
Monadnock—trails to top of Mt. Monadnock; scenic panorama (55).
Moose Brook—swimming, picnicking (6).
Mount Prospect—views of White Mts.; mansion of John Wingate Weeks (5).
Mount Sunapee—summer and winter sports; beach; chairlift (37).
Pillsbury—primitive woodland; camping, picnicking, swimming; at (42).
Rhododendron—abounds in flowering shrubs in July; picnicking (54).
Rye Harbor—picnic area overlooks harbor; northeast of (53).
Silver Lake—bathing, picnicking on lake front; west of (60).
Toll Gate—south side of Mount Kearsarge; lake and mountain scenery (40).
Wadleigh—swimming and picnicking on Kezar Lake (38).
Wellington—pine grove, beach on Newfound Lake (28).
Wentworth—picnicking; L. Wentworth; near (31).
White Lake—water sports; camping; White Mts. (25).
Winslow Site—north slope of Mt. Kearsarge; trails (39).



NATIONAL FOREST*

White Mountain—798,291 acres in state; total 851,842 acres in N. H. and Me.; hdqrs., Laconia, N.H.; area includes Crawford, Kinsman, Pinkham notches, and east side of Franconia Notch (4, 12, 19, 22).

STATE FORESTS*‡

Annett (Cheshire Co.)—1,360 acres (58).
Bear Brook (Merrimack & Rockingham Cos.)—7,233 acres (46).
Cardigan Mountain (Grafton Co.)—5,294 acres (27).
Connecticut Lakes (Coos Co.)—1,548 acres (1).
Crawford Notch (Carroll Co.)—5,950 acres (8).
Franconia Notch (Grafton Co.)—6,232 acres (13).
Hemenway (Carroll Co.)—1,958 acres (24).
Kearsarge Mountain (Merrimack Co.)—2,918 acres (41).
Mt. Sunapee (Merrimack Co.)—1,787 acres (36).
Pawtuckaway (Rockingham Co.)—1,384 acres (48).
Pillsbury (Sullivan Co.)—3,702 acres (42).

*Numbers in parentheses are keyed to map.
†There are also 6 wayside picnic areas.
‡There are more than 140 state forests in New Hampshire; the 11 largest are given here; many include state park facilities.

New Hampshire Fact Summary

THE PEOPLE BUILD THEIR STATE



1603—Martin Pring, in service of English merchants, explores Piscataqua River.

1605—Samuel de Champlain, French explorer, lands at Piscataqua Bay.

1614—Captain John Smith sails along New Hampshire coast; his book, 'Description of New England', attracts attention to the New England region.

1620—Plymouth Company receives grant as Council for New England to all land between 40th and 48th parallels, west from Atlantic Ocean.

1622—Council for New England grants to Sir Ferdinando Gorges and Capt. John Mason land between Merrimack and Kennebec rivers, called Province of Maine; includes much of present New Hampshire.

1623—David Thomson and colonists settle near present Portsmouth; settlement moved to west bank of harbor and named Strawberry Bank, 1631; renamed Portsmouth, 1653.

1629—Council for New England grants to Mason alone the area between Merrimack and Piscataqua rivers; Mason names it New Hampshire; later grants enlarge area. Mason, Gorges, and others receive Laconia Grant west of Merrimack and Kennebec rivers to Lake Ontario and St. Lawrence River.

1631—Edward Hilton receives grant to Dover tract, which he had already settled.

1633—First town government and first church in New Hampshire established at Dover.

1635—Death of Mason leaves land claims to settlers in doubt; "Masonian Controversy" not finally settled until 1787.

1638—Town of Exeter founded.

1639—Town of Hampton established.

1641—Four New Hampshire towns place themselves under government of Massachusetts; are attached to County of Norfolk.

1642—Darby Field and others discover White Mountains; Field is first to scale Mount Washington.

1647—New Hampshire towns required by Massachusetts legislation to furnish public education.

1675—King Philip's War starts; ends in 1678; Indians are made hostile by Major Waldron who tricks them into disarming at mock battle of Dover.

1679—New Hampshire becomes royal province; governor and council chosen by British king; legislative assembly selected by people.

1686—New Hampshire becomes part of Dominion of New England under Gov. Edmund Andros.

1689—King William's War brings new Indian attacks; Dover and other towns raided; war ends, 1697.

1692—New Hampshire becomes separate province.

1698—New Hampshire allies itself with Massachusetts in common defense against tyrannical governors.

1702—Queen Anne's War begins; brings minor attacks by Indians on settlers; war ends, 1713.

1719—Scotch-Irish settlers begin coming to Londonderry; introduce spinning of linen.

1721—Lovewell's War brings renewed Indian attacks; war ends, 1725, with defeat of Indians near Conway.

1740—Royal decree settles New Hampshire-Massachusetts border dispute.

1741—Benning Wentworth, born at Portsmouth, becomes governor of New Hampshire.

1744—King George's War brings renewed fighting with French and Indians; war ends, 1748.

1761—Stagecoach service opens, Boston-Portsmouth.

1763—End of French and Indian War brings peace to New Hampshire frontier.

1769—New Hampshire divided into 5 counties; effective, 1771. Dartmouth College chartered at Hanover.

1774—Military supplies at Fort William and Mary in Newcastle captured by colonists from British.

1775—Wentworth forced to resign as governor; Committee of Safety organized; first Provincial Congress meets at Exeter.

1776—Provincial Congress adopts temporary constitution for state, January 5; New Hampshire adopts a declaration of independence, June 15; privateers begin operating out of Portsmouth.

1777—Vermont becomes independent state, separating from New Hampshire. Gen. John Stark leads New Hampshire troops in defeat of British at battle of Bennington (Vt.), August 16.

1782—Vermont-New Hampshire border dispute settled; Vermont cedes border towns to New Hampshire.

1784—Present state constitution adopted, June 2.

1788—New Hampshire is 9th state to ratify U. S. Constitution, June 21; completes number necessary to inaugurate new federal government.

1792—Title of president of state changed to governor. First bank in state opens at Portsmouth.

1793—Paper mill built at Alstead.

1796—New Hampshire Turnpike from Portsmouth to Concord opened.

1800—U. S. government purchases site for Portsmouth Navy Yard.

1804—One of state's first cotton mills erected at New Ipswich.

1808—Concord becomes permanent state capital.

1813—Building of famous "Concord" stagecoaches begins at Concord about this time.

1815—Famous "Dartmouth College" case begins; won, 1819, by Daniel Webster, born near Franklin. (U. S. Supreme Court upholds federal contract.)

1819—Religious Toleration Act prohibits state taxation to raise money for church purposes. Power looms introduced in Manchester mills stimulate growth of New Hampshire's textile industry.

1822—First free library in state opened at Dublin.

1823—First shoe factory in state opened at Weare.

1833—Library founded at Peterborough; oldest in U. S. to be continuously tax-supported.

1852—Franklin Pierce, born at Hillsboro, elected 14th president of U. S.

1855—First state prohibition act is passed.

1868—New Hampshire College of Agriculture and Mechanic Arts opens at Hanover; moved to Durham, 1893; becomes Univ. of New Hampshire, 1923.

1881—Board of Health and Forestry Department created.

1905—Treaty ending Russo-Japanese War is signed at Portsmouth.

1909—Direct primary law passed.

1913—State Department of Agriculture established.

1919—New Hampshire Board of Education created.

1931—Governor establishes League of Arts and Crafts.

1950—State executive department reorganized. New Hampshire Turnpike, 15-mile Massachusetts-Maine shoreline toll road, completed.

1951—New Hampshire Business Development Corporation established to encourage new industries.

1953—Portsmouth-Rochester extension to New Hampshire Turnpike and Everett Turnpike between Nashua and Concord authorized.

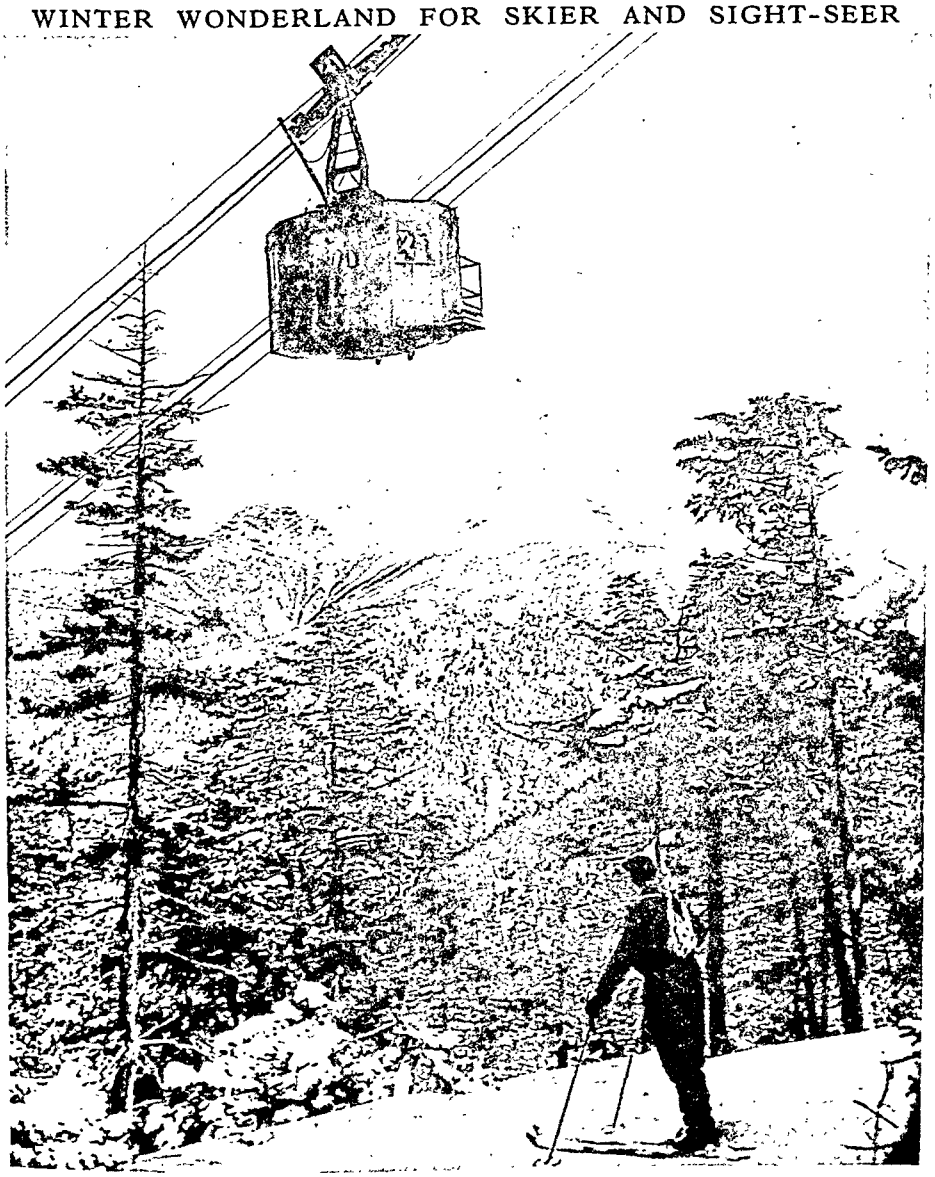
NEW HAMPSHIRE

COUNTIES		
Belknap	26,632	D 4
Carroll	15,868	D 4
Cheshire	38,811	B 6
Coos	35,932	D 2
Grafton	47,923	C 4
Hillsboro	156,987	C 6
Merrimack	63,022	C 5
Rockingham	70,059	D 5
Strafford	51,567	D 5
Sullivan	26,441	B 5

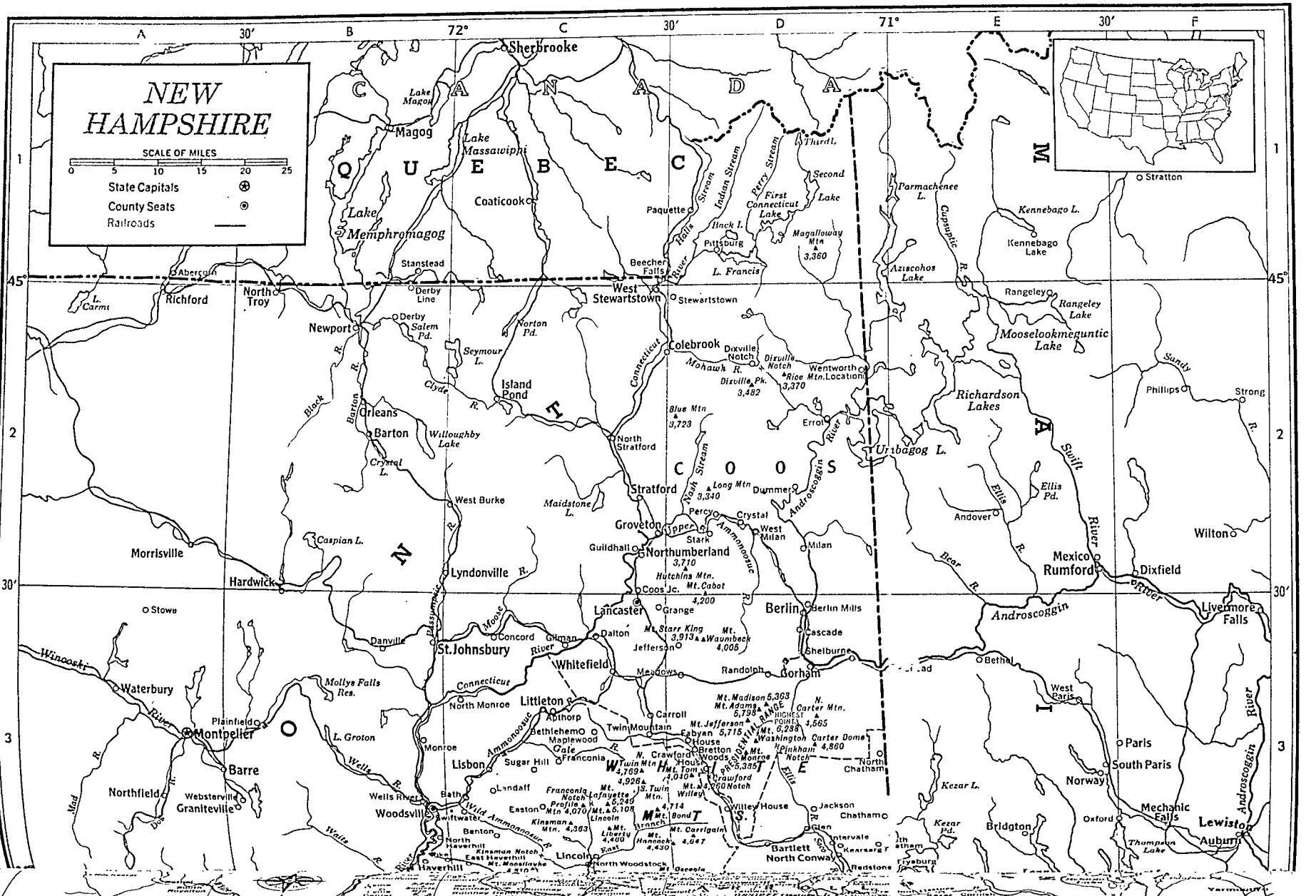
CITIES AND TOWNS		
Acworth	†418	B 5
Alexandria	†402	C 4
Allenstown	†1,540	D 5
Alstead	†851	B 5
Alton	†1,189	D 5
Alton Bay	200	D 5
Amherst	†1,461	C 6
Andover	†1,057	C 5
Antrim	†1,030	C 5
Apthorp		C 3
Ashland	†1,599	C 4
Ashuelot	500	B 6
Atkinson	†492	D 6
Atkinson Depot		D 6
Auburn	†1,158	D 5
Barnstead	†846	D 5
Barrington	†1,052	E 5
Bartlett	†1,074	D 3
Bath	†706	C 3
Bear Island		D 4
Bedford	†2,176	C 6
Beebe River	275	C 4
Belmont	†1,611	D 5
Bennington	†593	C 5
Benton	†247	C 3
Berlin	16,615	D 3
Berlin Mills		D 3
Bethlehem	†882	C 3
Blodgett		D 5
Blodgett Landing		C 5
Boscawen	†1,857	C 5
Bow	†1,062	C 5
Bradford	†606	C 5
Brentwood	†819	D 6
Bretton Woods	14	D 3
Bridgewater	†222	C 4
Bristol	†1,586	C 4
Brookfield	†159	D 4
Brookline	†671	C 6
Campton	†1,149	C 4
Canaan	†1,465	B 4
Canaan Ct.	179	B 4
Candia	†1,243	D 5
Canobie Lake	778	D 6
Canterbury	†627	C 5
Carroll	†359	D 3
Cascade	1,000	D 3
Center Barnstead	550	D 5
Center Conway	400	D 4
Center Harbor	†451	D 4
Center Ossipee	750	D 4
Center Sandwich	725	C 4
Center Strafford		D 5
Center Tuftonboro	500	D 4
Charlestown	†2,077	B 5
Chatham	†177	D 3
Chesham		B 6
Chester	†807	D 6
Chesterfield	†970	B 6
Chichester	†735	D 5
Chocorua	375	D 4
Claremont	12,811	B 5
Colebrook	†2,116	D 2
CONCORD	27,988	C 5
Contoocook	1,000	C 5
Conway	†4,109	D 4
Coos Junction		C 2
Cornish Flat	200	B 5
Crawford Hse.	6	D 3
Croydon	†349	B 5
Crystal	50	D 2
Dalton	†557	C 3
Danbury	†496	C 4
Danville	†508	D 6
Deerfield	†706	D 5
Deering	†392	C 5
Derry	†5,826	D 6
Dixville Notch	†13	D 2
Dorchester	†133	C 4
Dover	15,874	E 5
Drewsville	150	B 5
Dublin	†675	B 6

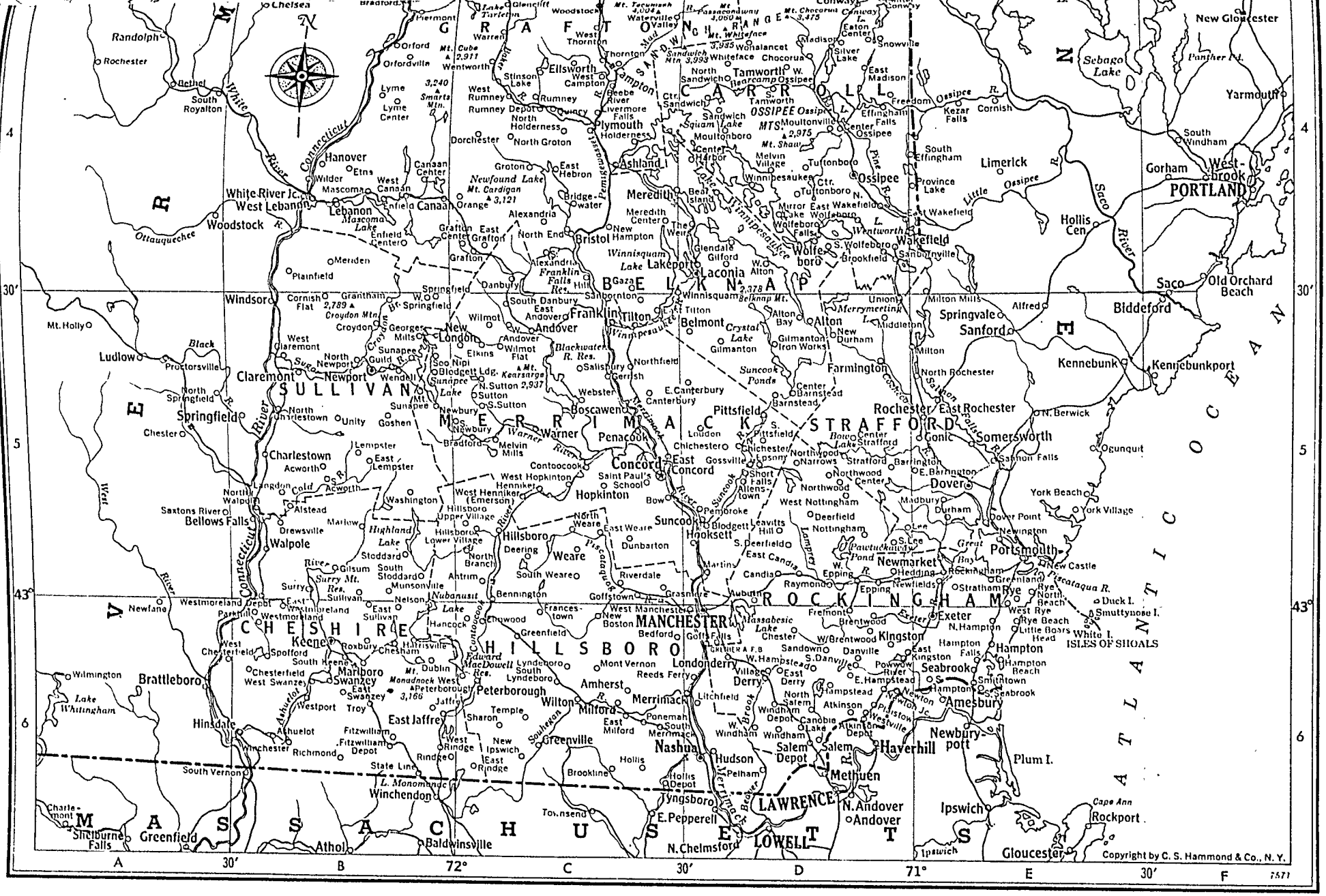
† Population of township

WINTER WONDERLAND FOR SKIER AND SIGHT-SEER



A tram car of the unique Cannon Mountain Aerial Tramway soars high over the head of a skier in its mile-long sky ride to the summit of Cannon Mountain. It offers a breath-taking view of the snow-covered mountains and valleys of New Hampshire at Franconia Notch. This scenic mountain gap in the White Mountains is in the west central part of the state in the Franconia Notch State Reservation.

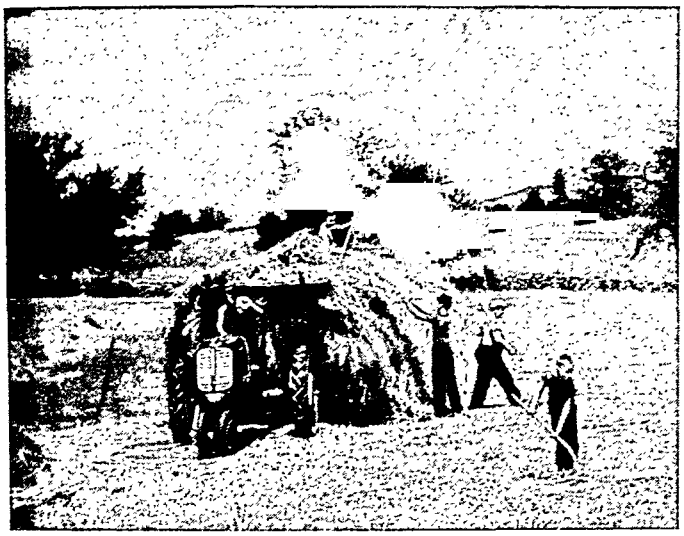

NEW HAMPSHIRE
SCALE OF MILES
0 5 10 15 20 25
State Capitals
County Seats
Railroads
CANADA
QUEBEC
MAINE
VERMONT
Sherbrooke
Lake Magog
Magog
Lake Massawippi
Lake Memphremagog
Coaticook
Stanstead
Abercorn
L. Carmi
Richford
North Troy
Derby Line
Newport
Derby
Salem Pd.
Norton Pd.
Seymour L.
Island Pond
Orleans
Barton
Willoughby Lake
Crystal L.
Black R.
Barton R.
Clyde R.
Morrisville
Caspian L.
Hardwick
West Burke
Lyndonville
Maidstone L.
Passumpsic R.
Moose R.
Connecticut R.
Paquette
Beecher Falls
West Stewartstown
Stewartstown
Colebrook
Dixville Notch
Dixville Pk. 3,482
Mohawk R.
Connecticut R.
North Stratford
Blue Mtn 3,723
Errol
Umbagog L.
Androscoggin R.
Stratford
Long Mtn 3,340
North Stream
Dummer
Groveton
Upper Ammonoosuc R.
Percy
Crystal
Stark
West Milan
Milan
Guildhall
Northumberland 3,710
Hutchins Mtn.
Mt. Cabot 4,200
Coos Jc.
Lancaster
Grange
Berlin
Berlin Mills
Cascade
Shelburne
Gorham
Randolph
Meadows
Jefferson
Mt. Starr King 3,913
Mt. Waumbeck 4,006
Dalton
Gilman
Concord
St. Johnsburg
Danville
Stowe
Winooski R.
Waterbury
Montpelier
Barre
Plainfield
Northfield
Webstersville
Graniteville
Mad R.
Dog R.
Mollys Falls Res.
L. Groton
Wells R.
Wells River
Woodsville
Swiftwater
Benton
North Haverhill
Haverhill
East Haverhill
Mt. Moosilauke 4,810
Kinsman Notch
Wild Ammonoosuc R.
Landaff
Bath
Lisbon
Sugar Hill
Franconia
Franconia Notch
Profile Mtn 4,070
Kinsman Mtn. 4,363
Easton
Lincoln
North Woodstock
Mt. Liberty 4,600
Mt. Lafayette 5,249
Mt. Lincoln 5,108
Mt. Hancock 4,430
Mt. Carrigain 4,647
Mt. Bond
Mt. Tom 4,010
Mt. Willey
Mt. Jefferson 5,715
Mt. Adams 5,798
Mt. Madison 5,363
Mt. Washington 6,288
Carter Dome 4,860
N. Carter Mtn. 4,565
Pinkham Notch
Crawford Notch 2,760
Twin Mtn. 4,769
S. Twin Mtn. 4,926
Willey House
Jackson
Chatham
North Chatham
Glen
Intervale
Kearsarge
Bartlett
North Conway
Redstone
Fryeburg
Kezar L.
Kezar Pd.
Bridgton
Oxford
Mechanic Falls
Lewiston
Auburn
Thompson Lake
Norway
South Paris
Paris
West Paris
Bethel
Rumford
Mexico
Dixfield
Andover
Wilton
Livermore Falls
Androscoggin R.
Bear R.
Ellis R.
Ellis Pd.
Swift River
Sandy R.
Phillips
Strong
Richardson Lakes
Rangeley
Rangeley Lake
Mooselookmeguntic Lake
Kennebago L.
Kennebago Lake
Parmachenee L.
Cupsuptic R.
Azischohos Lake
Third L.
Second Lake
First Connecticut Lake
Hinck L.
Pittsburg
Magalloway Mtn 3,360
Percy Stream
Indian Stream
Halls Stream
L. Francis
Stratton
PRESIDENTIAL RANGE
HIGHEST POINTS
Mt. Pleasant
Mt. Monroe
Mt. Willard
Mt. Carrigain
Mt. Bond
Mt. Hancock
Mt. Liberty
Mt. Lafayette
Mt. Lincoln
Mt. Moosilauke
Mt. Osceola
Mt. Cabot
Mt. Starr King
Mt. Waumbeck
Mt. Jefferson
Mt. Adams
Mt. Madison
Mt. Monroe
Mt. Washington
Mt. Pleasant
Mt. Willard
Mt. Carrigain
Mt. Bond
Mt. Hancock
Mt. Liberty
Mt. Lafayette
Mt. Lincoln
Mt. Moosilauke
Mt. Osceola


Randolph
Rochester
Bethel
South Royalton
White River Jc.
West Lebanon
Hanover
Etna
Wilder
Mascoma
West Canaan
Canaan Center
Canaan
Enfield
Lebanon
Mascoma Lake
Enfield Center
Woodstock
Ottauquechee R.
Windsor
Cornish Flat
Grantham
Mt. Holly
Ludlow
Proctorsville
Black R.
Claremont
Newport
Springfield
North Springfield
Chester
Charlestown
Acworth
Cold R.
Walpole
Bellows Falls
Saxtons River
Westminster
Newfane
Brattleboro
Wilmington
Lake Whitingham
Hinsdale
Winchester
Richmond
Swanzey
Keene
Chesterfield
Marlboro
Peterborough
Jaffrey
East Jaffrey
Troy
Fitzwilliam
Rindge
South Vernon
Winchendon
Charlemont
Shelburne Falls
Greenfield
Athol
Baldwinsville
Townsend
Ashburnham
Gardner
Templeton
Fitchburg
Leominster
Lunenburg
Ayer
Harvard
Littleton
Groton
Pepperell
Tyngsboro
Dunstable
Nashua
Hudson
Pelham
Salem Depot
Methuen
Lawrence
Andover
North Andover
Lowell
North Chelmsford
Tewksbury
Wilmington
Reading
Melrose
Malden
Medford
Somerville
Cambridge
Boston
Brookline
Newton
Wellesley
Natick
Framingham
Hopkinton
Milford
Hollis
Amherst
Merrimack
Litchfield
Londonderry
Derry
Windham
Salem
Haverhill
Newburyport
Plum I.
Amesbury
Seabrook
Hampton
Hampton Falls
Exeter
Kingston
Newmarket
Durham
Dover
Portsmouth
New Castle
Rye
Rye Beach
North Hampton
Little Boars Head
White I.
ISLES OF SHOALS
Duck I.
Smuttynose I.
Great Bay
Pawtuckaway Pond
Lee
Nottingham
Deerfield
Northwood
Epping
Raymond
Fremont
Brentwood
Stratham
Greenland
Newington
Madbury
York Beach
York Village
Dover Point
Rochester
East Rochester
Farmington
Milton
Milton Mills
Alton
Alton Bay
Wolfeboro
Wakefield
East Wakefield
Ossipee
Effingham
Freedom
Tamworth
Conway
North Conway
Jackson
Bartlett
Glen
Intervale
Chocorua
Whitefield
Lancaster
Berlin
Gorham
Randolph
Jefferson
Lisbon
Littleton
Bethlehem
Franconia
Sugar Hill
Lincoln
North Woodstock
Plymouth
Holderness
Ashland
Meredith
Laconia
Belmont
Tilton
Franklin
Bristol
Hill
Danbury
Grafton
Enfield
Lebanon
Hanover
Norwich
Thetford
Fairlee
Bradford
Newbury
Haverhill
Woodsville
Wells River
Barre
Montpelier
Northfield
Waterbury
Stowe
Morrisville
Hyde Park
Johnson
Lamoille
Milton
Essex Jc.
Burlington
Winooski
Colchester
Shelburne
Charlotte
Hinesburg
Williston
Richmond
Jericho
Underhill
Bolton
Waterbury
Middlesex
Montpelier
Barre
Plainfield
Marshfield
Cabot
Danville
St. Johnsbury
Lyndonville
Wheelock
Sutton
Barnet
Peacham
Groton
Ryegate
Corinth
Bradford
Newbury
Topsham
Orford
Lyme
Hanover
Norwich
Thetford
Fairlee
Bradford
Newbury
Haverhill
Woodsville
Wells River
Barre
Montpelier
Northfield
Waterbury
Stowe
Morrisville
Hyde Park
Johnson
Lamoille
Milton
Essex Jc.
Burlington
Winooski
Colchester
Shelburne
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Middlesex
Montpelier
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Plainfield
Marshfield
Cabot
Danville
St. Johnsbury
Lyndonville
Wheelock
Sutton
Barnet
Peacham
Groton
Ryegate
Corinth
Bradford
Newbury
Topsham
Orford
Lyme
Connecticut River
Ottauquechee R.
Black R.
Sugar R.
Cold R.
Saxtons River
Williams River
Ashuelot R.
Contoocook R.
Piscataquog R.
Merrimack River
Souhegan R.
Nashua R.
Pemigewasset R.
Winnipesaukee R.
Lake Winnipesaukee
Newfound Lake
Squam Lake
Winnisquam Lake
Lake Waukewan
Lake Wentworth
Ossipee Lake
Province Lake
Crystal Lake
Suncook Ponds
Blackwater R. Res.
Surry Mt. Res.
Nubanusit Lake
Highland Lake
Spofford Lake
Edward MacDowell Lake
Massabesic Lake
Great Bay
Pawtuckaway Pond
Lamprey R.
Oyster R.
Squamscott R.
Exeter R.
Saco River
Little Ossipee R.
Pine R.
Province Lake
Sebago Lake
Panther Pd.
Kezar Falls
Cornish
Limerick
South Effingham
Gorham
Westbrook
PORTLAND
Hollis Cen
Saco
Old Orchard Beach
Biddeford
Springvale
Sanford
Kennebunk
Kennebunkport
North Berwick
Somersworth
Rochester
Dover
Portsmouth
Newmarket
Exeter
Kingston
Hampton
Seabrook
Amesbury
Newburyport
Haverhill
Plum I.
Ipswich
Rockport
Gloucester
Cape Ann
ATLANTIC OCEAN
SULLIVAN
MERRIMACK
STRAFFORD
BELKNAP
GRAFTON
CARROLL
COOS
CHESHIRE
HILLSBORO
ROCKINGHAM
ESSEX
Mt. Cube 2,911
Mt. Tecumseh 3,004
Mt. Moosilauke 4,802
Mt. Chocorua 3,475
Mt. Whiteface 3,995
Sandwich Mtn. 3,993
Mt. Passaconaway 4,060
Mt. Washington 6,288
Mt. Lafayette 5,260
Mt. Lincoln 5,089
Mt. Liberty 4,459
Mt. Flume 4,328
Mt. Carrigain 4,700
Mt. Osceola 4,340
Mt. Tripyramid 4,140
Mt. Cardigan 3,121
Mt. Kearsarge 2,937
Mt. Monadnock 3,166
Mt. Dublin
Mt. Shaw
Mt. Belknap 2,378
Mt. Smarts 3,240
Mt. Cardigan 3,121
Mt. Kearsarge 2,937
Mt. Monadnock 3,166
Mt. Dublin
Mt. Shaw
Mt. Belknap 2,378
OSSIPEE MTS. 2,975
Sandwich Mtn. 3,993
Mt. Whiteface 3,995
Mt. Chocorua 3,475
Mt. Passaconaway 4,060
Mt. Tecumseh 3,004
Mt. Moosilauke 4,802
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Mt. Flume 4,328
Mt. Carrigain 4,700
Mt. Osceola 4,340
Mt. Tripyramid 4,140
Mt. Washington 6,288
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NEW HAMPSHIRE—*Continued*

Dummer	†229	D 2
Dunbarton	†533	C 5
Durham	†4,770	E 5
E. Andover		C 5
E. Barrington		E 5
E. Candia	250	D 5
E. Canterbury		D 5
E. Concord		D 5
E. Derry	300	D 6
E. Grafton	100	C 4
E. Hampstead	920	D 6
E. Haverhill	150	C 3
E. Hebron		C 4
E. Jaffrey	1,866	B 6
E. Kingston	†449	E 6
E. Lempster		B 5
E. Madison	80	D 4
E. Milford		C 6
E. Rindge	200	C 6
E. Rochester	1,100	E 5
E. Sullivan	150	B 6
E. Swanzey	700	B 6
E. Tilton		D 5
E. Wakefield		E 4
E. Weare	260	C 5
E. Westmoreland	200	B 6
E. Wolfeboro	301	D 4
Easton	†94	C 3
Eaton Ct.	†221	D 4
Effingham Falls	†341	D 4
Elkins	200	C 5
Ellsworth	†24	C 4
Elmwood		C 6
Emerson (W. Henniker)		C 5
Enfield	†1,612	B 4
Enfield Center		B 4
Epping	†1,796	D 5
Epsom	†756	D 5
Errol	†224	D 2
Etna		B 4
Exeter	†5,664	E 6
Fabyan House	300	D 3
Fairview		C 3
Farmington	†3,454	D 5
Fitzwilliam	†872	B 6
Fitzwilliam Depot	250	B 6
Francestown	†405	C 6
Franconia	†549	C 3
Franklin	6,552	C 5
Freedom	†315	E 4
Fremont	†698	D 6
Gaza		C 4
Georges Mills	170	B 5
Gerrish	275	C 5
Gilford	†1,251	D 4
Gilmanton	†754	D 5
Gilmanton Iron Works		D 5
Gilsum	†578	B 5
Glen		D 3
Glencliff	200	C 4
Glendale		D 4
Goffs Falls	800	D 6
Goffstown	†5,638	C 5
Gonic	1,000	E 5
Gorham	†2,639	D 3
Goshen	†356	B 5
Gossville	300	D 5
Grafton	†442	C 4
Grafton Center	93	C 4
Grange	80	D 3
Grantham	†359	B 5
Grasmere	1,545	D 5
Greenfield	†430	C 6
Greenland	†719	E 5
Greenville	†1,280	C 6
Groton	†105	C 4
Groveton	1,918	C 2
Guild	200	B 5
Hampstead	†902	D 6
Hampton	†2,847	E 6
Hampton Beach		E 6
Hampton Falls	†629	E 6
Hancock	†612	B 6
Hanover	†6,259	B 4
Harrisville	†519	B 6
Haverhill	†3,357	B 3
Hedding		E 5
Henniker	†1,675	C 5
Hill	†310	C 4
Hillsboro	†2,179	C 5
Hillsboro Lower Village	400	C 5
Hillsboro Upper Village	500	C 5
Hinsdale	†1,950	A 6
Holderness	†731	C 4
Hollis	†1,196	C 6
Hollis Depot	380	C 6
Hooksett	†2,792	D 5
Hopkinton	†1,831	C 5
Hudson	†4,183	D 6
Intervale	600	D 3
Jackson	†344	D 3
Jaffrey	†2,911	B 6
Jefferson	†728	C 3
Kearsarge		D 3
Keene	15,638	B 6
Kingston	†1,283	D 6
Laconia	14,745	D 4
Lakeport	3,600	C 4
Lancaster	†3,113	C 3
Landaff	†342	C 3
Langdon	378	B 5
Leavitts Hill		D 5
Lebanon	†8,495	B 4
Lee	†575	E 5
Lempster	†309	B 5
Lincoln	†1,415	C 3
Lisbon	†2,009	C 3
Litchfield	†427	D 6
Little Boars Head		E 6
Littleton	†4,817	C 3
Livermore Falls		C 4
Londonderry	†1,640	D 6
Loudon	†1,012	D 5
Lyme	†924	B 4
Lyme Center	350	B 4
Lyndeboro	†552	C 6
Madbury	†489	E 5
Madison	†486	D 4
Manchester	82,732	C 6
Maplewood		C 3
Marlboro	†1,561	B 6
Marlow	†330	B 5
Martins		D 5
Mascoma	100	B 4
Meadows	89	C 3
Melvin Mills	65	C 5
Melvin Village		D 4
Meredith	†2,222	C 4
Meredith Ct.	150	C 4
Meriden	500	B 4
Merrimack	†1,908	C 6
Middleton	†255	D 5
Milan	†743	D 2
Milford	†4,159	C 6
Milton	1,510	E 5
Milton Mills	280	E 5
Mirror Lake	135	D 4
Monroe	†410	B 3
Mont Vernon	†405	C 6
Moultonboro	†880	D 4
Moultonville	200	D 4
Mt. Sunapee	125	B 5
Munsonville		B 5
Nashua	34,669	C 6
Nelson	†231	B 5
New Boston	†865	C 6
New Castle	†583	E 5
New Durham	†463	D 5
New Hampton	†723	C 4
New Ipswich	†1,147	C 6
New London	†1,484	C 5
Newbury	†320	C 5
Newfields	†469	E 5
Newington	†494	E 5
Newmarket	†2,709	D 5
Newport	†5,131	B 5
Newton	†1,173	E 6
Newton Junction		D 6
N. Branch		C 5
N. Charlestown	200	B 5
N. Chatham	177	D 3
N. Chichester	740	D 5
N. Conway	1,200	D 3
N. End		C 4
N. Groton	30	C 4
N. Hampton	†1,104	E 6
N. Haverhill	500	C 3
N. Holderness		C 4
N. Monroe	160	C 3
N. Newport	200	B 5
N. Rochester		E 5
N. Salem	400	D 6
N. Sandwich		D 4
N. Stratford		C 2
N. Sutton		C 5
N. Wakefield		D 4
N. Walpole	1,000	B 5
N. Weare		C 5
N. Woodstock	675	C 3
Northfield	†1,561	C 5
Northumberland	†2,779	D 2
Northwood	†966	D 5
Northwood Center	120	D 5
Northwood Narrows	325	D 5
Nottingham	†566	D 5
Orange	†82	C 4
Orford	†726	B 4
Orfordville		B 4
Ossipee	†1,412	D 4
Parkhill	45	B 6
Pelham	†1,317	D 6
Pembroke	†3,094	D 5
Penacook	3,100	C 5
Percy	48	D 2
Peterborough	†2,556	C 6
Piermont	†511	B 4
Pike	175	B 3
Pittsburg	†697	D 1
Pittsfield	†2,321	D 5
Plainfield	†1,011	B 4
Plaistow	†2,082	D 6
Plymouth	†3,039	C 4
Ponemah		C 6
Portsmouth	18,830	E 5
Powwow R.	75	D 6
Province Lake		E 4
Quincy	125	C 4
Randolph	†158	D 3
Raymond	†1,428	D 5
Redstone	250	D 3
Reeds Ferry	500	C 6
Richmond	†259	B 6
Rindge	†707	B 6
Riverdale		C 5
Rochester	13,776	D 5
Rockingham		E 5
Roxbury	†117	B 6
Rumney	†859	C 4
Rumney Depot	165	C 4
Rye	†1,982	E 5
Rye Beach	1,000	E 6
Rye North Beach		E 5
St. Paul's School		C 5
Salem	†4,805	D 6
Salem Depot	1,637	D 6
Salisbury	†423	C 5
Salmon Falls	1,290	E 5
Sanbornton	†755	C 5
Sanbornville	460	E 4
Sandown	†315	D 6
Sandwich	†615	D 4
Seabrook	†1,788	E 6
Sharon	†62	C 6
Shelburne	†184	D 3
Short Falls	100	D 5
Silver Lake	500	D 4
Smithtown	100	E 6
Snowville	100	D 4
Somersworth	6,927	E 5
Soo Nipi	25	C 5
S. Acworth		B 5
S. Alexandria	100	C 4
S. Chatham	54	E 3
S. Danbury		C 5
S. Danville	125	D 6
S. Deerfield		D 5
S. Effingham		E 4
S. Hampton	†314	E 6
S. Keene	200	B 6
S. Lee	70	D 5
S. Lyndeboro	552	C 6
S. Merrimack	250	C 6
S. Newbury	88	C 5
S. Pittsfield		D 5
S. Seabrook	1,000	E 6
S. Stoddard		B 5
S. Sutton	139	C 5
S. Tamworth		D 4
S. Wolfeboro	248	D 4
S. Weare		C 5
Spofford	350	B 6
Springfield	†324	B 4
Stark	†373	D 2
State Line	125	B 6
Stewartstown	†970	D 2
Stinson Lake		C 4
Stoddard	†200	B 5
Strafford	†770	D 5
Stratford	†973	C 2
Stratham	†759	E 5
Sugar Hill	250	C 3
Sullivan	†272	B 5
Sunapee	†1,108	B 5
Suncook		C 5
Surry	†291	B 5
Sutton	†554	C 5
Swanzey	†2,806	B 6
Swiftwater		C 3
Tamworth	†1,025	D 4
Temple	†330	C 6
The Weirs		D 4
Thornton	†460	C 4
Tilton	†2,085	C 5
Troy	†1,360	B 6
Tuftonboro	†697	D 4
Twin Mt.	352	C 3
Union	550	D 5
Unity	†653	B 5
Village		D 6
Wakefield	†1,267	E 4
Walpole	†2,536	B 5
Warner	†1,080	C 5
Warren	†581	C 4
Washington	†168	B 5
Waterville Valley	†11	C 4
Weare	†1,345	C 4
Webster	†386	C 5
Wendell	200	B 5
Wentworth	†413	C 4
Wentworth Location	†48	D 2
W. Alton		D 4
W. Andover		C 5
W. Brentwood		D 6
W. Campton	125	C 4
W. Canaan		B 4
W. Chesterfield	250	A 6
W. Claremont	100	B 5
W. Epping		D 5
W. Hampstead		D 6
W. Henniker (Emerson)		C 5
W. Hopkinton	100	C 5
W. Lebanon	1,737	B 4
W. Manchester		C 6
W. Milan	250	D 2
W. Nottingham	80	D 5
W. Ossipee	175	D 4
W. Peterborough	350	B 6
W. Rindge	230	C 6
W. Rumney	200	C 4
W. Rye	55	E 6
W. Springfield	100	B 5
W. Stewartstown	385	C 2
W. Swanzey	1,400	B 6
W. Thornton	450	C 4
W. Windham		D 6
Westmoreland	†789	B 6
Westmoreland Depot		A 6
Westport	328	B 6
Westville	300	D 6
Whiteface		D 4
Whitefield	†1,677	C 3
Willey House	10	D 3
Wilmot	†370	C 5
Wilmot Flat		C 5
Wilton	†1,952	C 6
Winchester	†2,388	B 6
Windham	†964	D 6
Windham Depot		D 6
Winnipesaukee		D 4
Winnisquam	400	D 5
Wolfeboro	†2,581	D 4
Wolfeboro Falls	600	D 4
Wonalancet	36	D 4
Woodstock	894	C 4
Woodsville	1,542	B 3

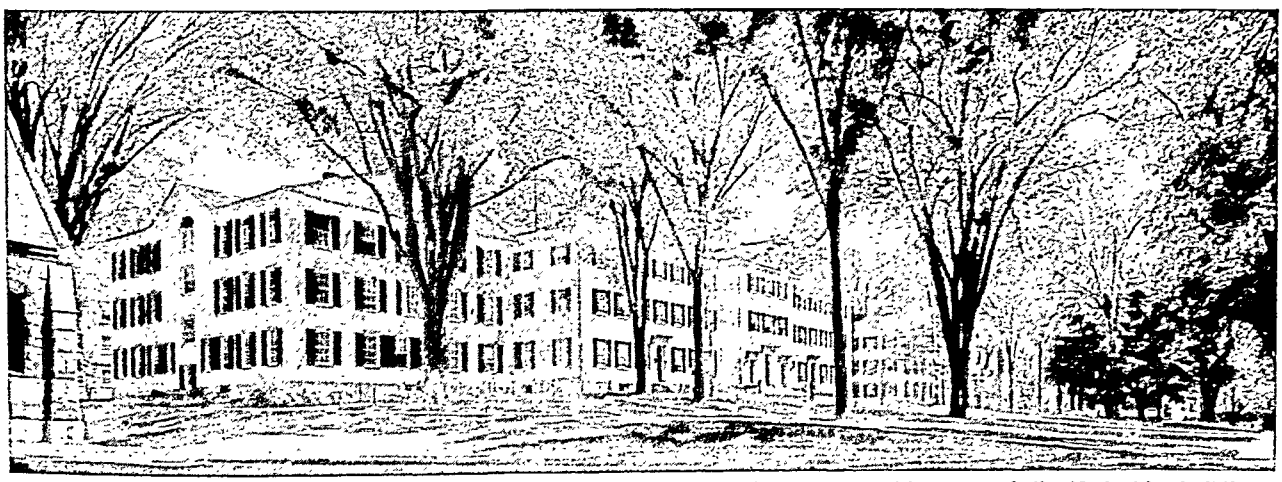
† Population of township



Amid gently rolling hills patched with clumps of trees, farm boys help gather hay to make feed for livestock. Dairying and haying are the two principal farm activities in New Hampshire.



In this quarry near Concord, one of the many in the Granite State, the huge blocks are hewn from the granite shelf and lifted out by derricks. Stone is a leading mineral of the state.



There is colonial charm about the "Old Row" of famous Dartmouth College at Hanover. From an Indian school in a log hut built in 1770 grew this group of dignified white buildings. Dartmouth is the state's oldest institution of higher learning.



Winter makes a picturesque setting for the beautiful campus of the University of New Hampshire at Durham. This coeducational state university is the largest school in the state.



Above Concord rises the green-domed capitol of New Hampshire. The state house was built in 1819 of Concord granite and Vermont marble. On the pedestal is a statue of Daniel Webster.

The city of Nashua is also the distributing center for an extensive agricultural district. Concord, the capital, on the Merrimack, is a manufacturing center and nearby are extensive quarries of fine-grained white granite. It is the seat of St. Paul's School. This school and Phillips Exeter Academy at Exeter are among the best-known college preparatory schools for boys in the United States (*see* Concord). The state's higher institutions of education include the University of New Hampshire at Durham, state teachers colleges at Keene and Plymouth, Dartmouth College at Hanover, and St. Anselm's College (Roman Catholic) for men at Manchester.

The State's History

What is now the state of New Hampshire began with many isolated settlements woven into a bewildering maze of English land grants to absentee companies or landlords. The first settlements were at the mouth of the Piscataqua, in 1623. Captain John Mason and Sir Ferdinando Gorges were the most prominent grantees of the region between the Merrimack and Piscataqua rivers. Mason gave the area the name of New Hampshire, after his own county of Hampshire in England. Both grantees were stanch Church of England men and friends of King James I. There were disputes with Massachusetts arising out of conflicting grants. For about 70 years New Hampshire was either a part of Massachusetts or was under a Massachusetts governor appointed by the crown. The colony became a province under its own governor in 1741.

A boundary dispute with Massachusetts was finally settled at this time. Massachusetts had claimed the area west of the Merrimack up to the river's source. The king, however, gave this land to New Hampshire by running the boundary west from a point on the Merrimack 50 miles south of its source. New Hampshire also had many disputes with New York over the region between them. The disputes were settled in 1791 by admitting the region to the Union as the state of Vermont. The Connecticut River was made the western boundary of New Hampshire.

New Hampshire was the ninth state to ratify the Federal Constitution (June 21, 1788). This completed the number needed to start the new government. (*See also* chronology in New Hampshire Fact Summary; United States, section "New England.")

NEW HAVEN, CONN. The "city of elms," famed for 200 years as the seat of Yale University, is situated at the head of New Haven Harbor, an inlet of Long Island Sound 72 miles northeast of New York City. New Haven is Connecticut's second city in population and manufactures and one of the foremost educational centers of the United States.

A line of rugged hills, ending in two 360- and 400-foot spurs called East Rock and West Rock, looks down upon the city built on a plain. The older part of the city is laid out in squares around the 16-acre public Green. Once a social and religious center, it has three churches of architectural interest built in the early 1800's. North and east of the Green rise the fine buildings of Yale University. The city has beautiful public buildings and parks.

With its harbor and the main line and branches of the New York, New Haven, and Hartford Railroad, the city has good shipping facilities. It is a distributing point for coal, cement, lumber, and fertilizer brought by water and for farm and factory products sent in and out by rail and truck.

New Haven is an industrial city producing a great variety of manufactures. They include firearms, clocks, hardware, tools, steel products, copper wire and cables, electrical parts and appliances, batteries, tires, rubber goods, paper boxes, chemicals, zippers, corsets, and toys. In the city also are the main offices and machine and repair shops of the New Haven Railroad.

New Haven was called by its Indian name Quinnipiac (Long River Place) in 1638 when Theophilus Eaton, John Davenport, and a small company of Puritans settled there. Two years later it received its present name (after Newhaven, England). It remained a colony separate from Connecticut until 1662. From 1701 to 1875 New Haven was the joint capital with Hartford. In 1716 Yale College was moved here from Saybrook. New Haven is the burial place of such famous men as Noah Webster, Samuel F. B. Morse, Lyman Beecher, Eli Whitney, and Roger Sherman.

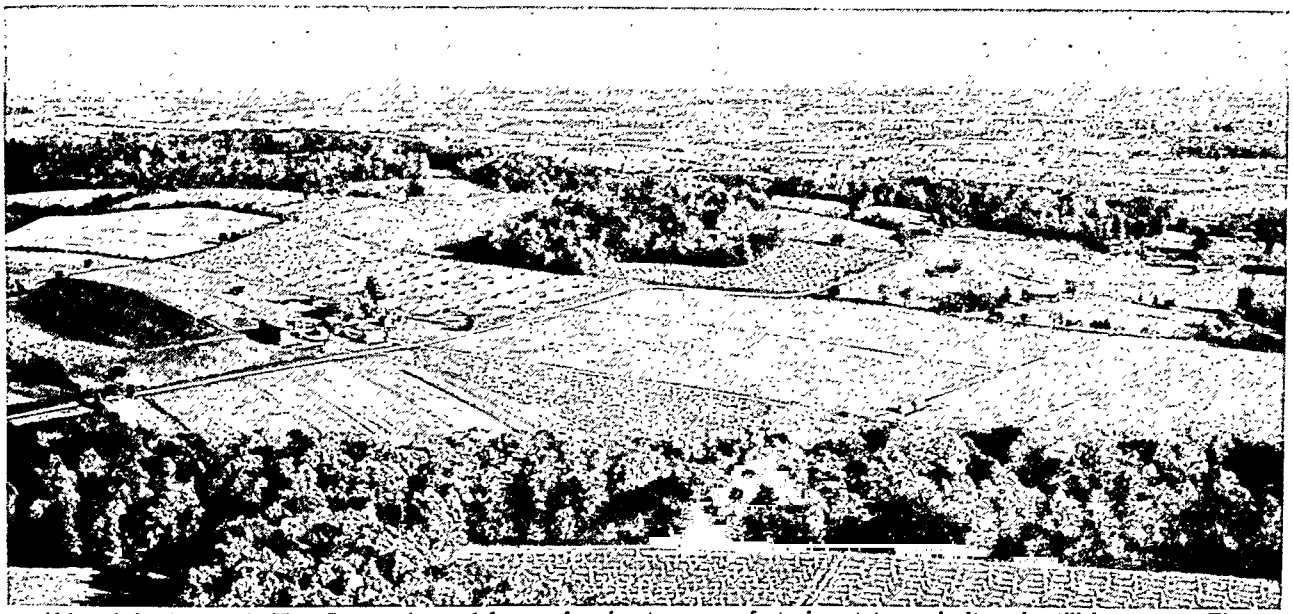
In 1949 a tunnel was opened through West Rock enabling New York-Massachusetts traffic to skirt the city. New Haven has a mayor-council form of government. Population (1950 census), 164,443.

NEW HAMPSHIRE'S MOUNTAIN-CLIMBING RAILROAD



A descending train of the Mount Washington Cog Railway can be seen just above Base Station house, near Bretton Woods. The railroad climbs three miles to the summit of Mount Washington, called "the top of New England." The round trip takes about three hours. This line, the world's first mountain-climbing railroad, was built in 1869.

NEW JERSEY, *a* GARDEN *and* FACTORY *State*



Although in the 1800's New Jersey changed from a farming to a manufacturing state, agriculture is still important. The state's rich farms supply cities in several states with diverse produce, including truck crops, fruit, and dairy and poultry products. The numerous large truck farms have won for New Jersey the nickname of the "Garden State."

NEW JERSEY. "Like a cider barrel tapped at both ends" was Benjamin Franklin's description of New Jersey in the late 1700's. At that time New York City and Philadelphia were attracting many people from the farms and towns of the New Jersey colony.

Today New York and Philadelphia still tap New Jersey for a good share of their supplies of fresh food. The markets of these two cities receive trucks that are loaded with fresh Jersey fruits and vegetables from early spring until late fall. They also receive New Jersey milk, butter, chickens, and eggs.

Every morning thousands of New Jersey commuters board trains, ferries, and busses for their work in New York and Philadelphia. Because these cities have become overcrowded, many who work there have found it necessary or preferable to live in New Jersey. Every evening they commute back to their homes in New Jersey cities, towns, or suburbs. These commuters are only a small part of the inhabitants. About 90 per cent work within their own state.

New Jersey ranks 45th in area among the states in the Union. Only Connecticut, Delaware, and Rhode Island are smaller in size. Yet New Jersey has almost 5 million people and ranks 8th in population. It is the second most densely populated state, with an average of about 643 persons to the square mile.

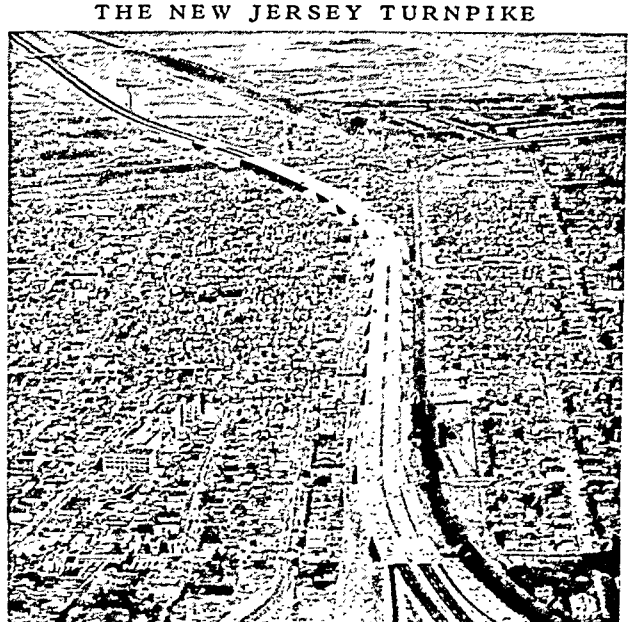
Most of the population is concentrated in the northeast corner near New York City. Within a radius of 30 miles from Newark, New Jersey's largest city, are the state's five largest counties and three largest cities. Here live about $3\frac{1}{2}$ million people, or 70 per cent of the state's population. About nine out of ten people in New Jersey live in cities or towns.

The State's Geography

New Jersey is surrounded by water except for the 50-mile strip bordering New York. West and south are the Delaware River and Delaware Bay. On the east are the Atlantic Ocean, New York Bay, and Hudson River.

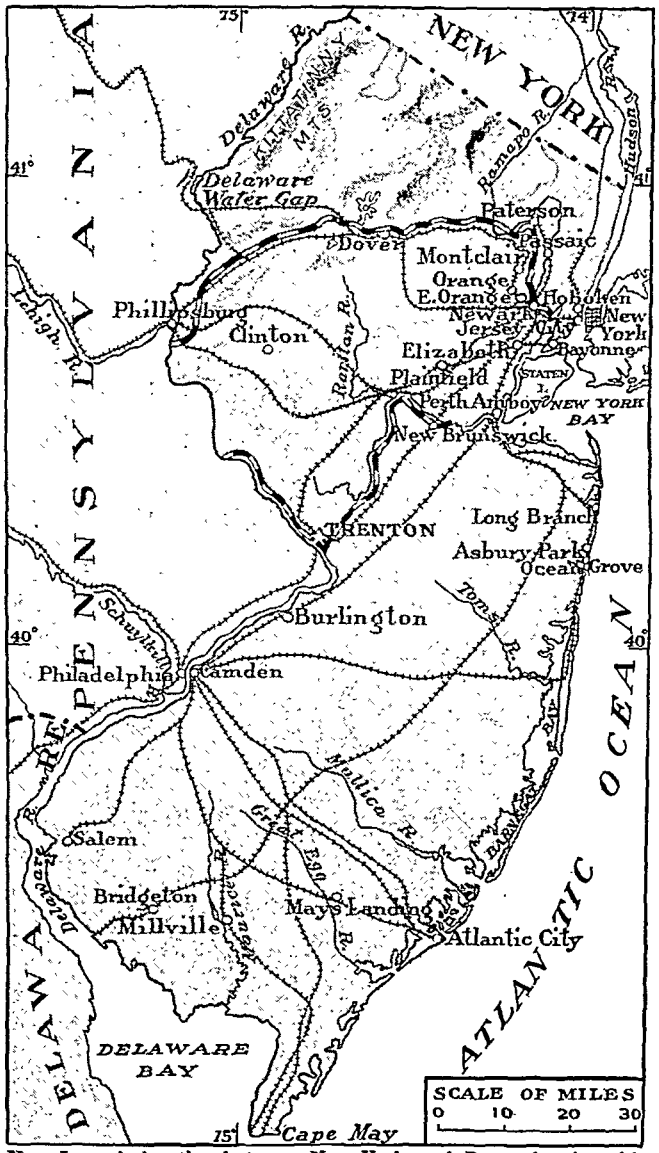
The state has five sections that run in parallel strips in a northeasterly direction. The Kittatinny Mountains, part of the Appalachians, are along the Delaware in the northwest. They extend from Delaware Water Gap to the New York line. Here High Point rises to 1,801 feet, the state's highest elevation. The second section is fertile Kittatinny Valley, between the Kittatinny Mountains and the Highlands.

THE NEW JERSEY TURNPIKE



This Fairchild air view shows the New Jersey Turnpike as it cuts through Elizabeth. The 118-mile expressway is a toll road designed to carry the heavy traffic of the industrial heart of the state. It has no traffic lights or crossroads along its length.

NEW JERSEY'S FINE POSITION



New Jersey's location between New York and Pennsylvania, with many good railroads, highways, and ports, gives the state a key position for industry and trade. Most of its factories are in northeastern cities, near New York. Farms are scattered everywhere.

The scenic Highlands are the third section. They are northwest of a line running through Clinton and Pompton Plains. Still farther southeast is the Piedmont Plateau, a 20- to 30-mile rolling upland belt extending from the Delaware to the New York border.

The fifth section, the Coastal Plain, covers the southern half of the state. It is southeast of the fall line of the rivers, which extends from Trenton to Perth Amboy. The plain is less than a hundred feet above sea level. Much of it is marshland suitable for raising cranberries. Here is an extensive area of stunted pine woods—the Pine Barrens; here also are large areas of sandy soils. Parts of this section are devoted to truck crops, fruits, and poultry.

The northern part of the state has a number of small lakes. Many are bordered by cottages and hotels, which are used by thousands of summer visitors from Jersey cities and New York. The largest is Lake Hopatcong, west of Paterson.

New Jersey Resorts

Even more popular as a vacation land is the Atlantic shore line with its noted summer resorts. The 125 miles of surf-washed, salt-water beaches from Sandy Hook to Cape May are dotted with some 50 resort cities and towns. All these places have a pleasant summer climate, sandy beaches, and summer hotels and cottages. Many are on or near bays or inlets which are ideal for sailing. Up and down the long Atlantic coast, sportsmen enjoy deep-sea, bay, and surf fishing.

South of Sandy Hook, or "the Hook," as it is often called, are the resort cities of Long Branch, Asbury Park, and Ocean Grove. About 60 miles south of Ocean Grove is Atlantic City (*see* Atlantic City). It is the largest year-round resort in the United States. Almost any month of the year its many splendid hotels are crowded with tourists on vacation or guests attending conventions, which are attracted by its fine facilities. At the extreme southern tip of the state is Cape May. It is the oldest of all Jersey coastal resorts and was once among the most fashionable.

Resources of Land and Sea

New Jersey's main farm products are milk, eggs, truck crops, chickens, potatoes, corn, hay, cattle, and hogs. Dairying is important in virtually every county. Great poultry farms are located mostly in the north. Nearly all the state's hay is used to feed dairy cows. Much of its corn goes to the feeding of cattle and poultry.

New Jersey earns its nickname, "the Garden State" from its many truck farms. It is one of the leading states in production of truck crops. Almost every kind of temperate-climate fruit and vegetable can be raised in some part of the state. Jersey sweet potatoes are produced in large amounts. The state is second only to California in raising asparagus. Many orchards produce apples and peaches; plums, cherries, and currants are common to all sections. The southern counties produce large quantities of strawberries, raspberries, blackberries, and grapes. The annual yield of cranberries grown here is exceeded only by Massachusetts and Wisconsin.

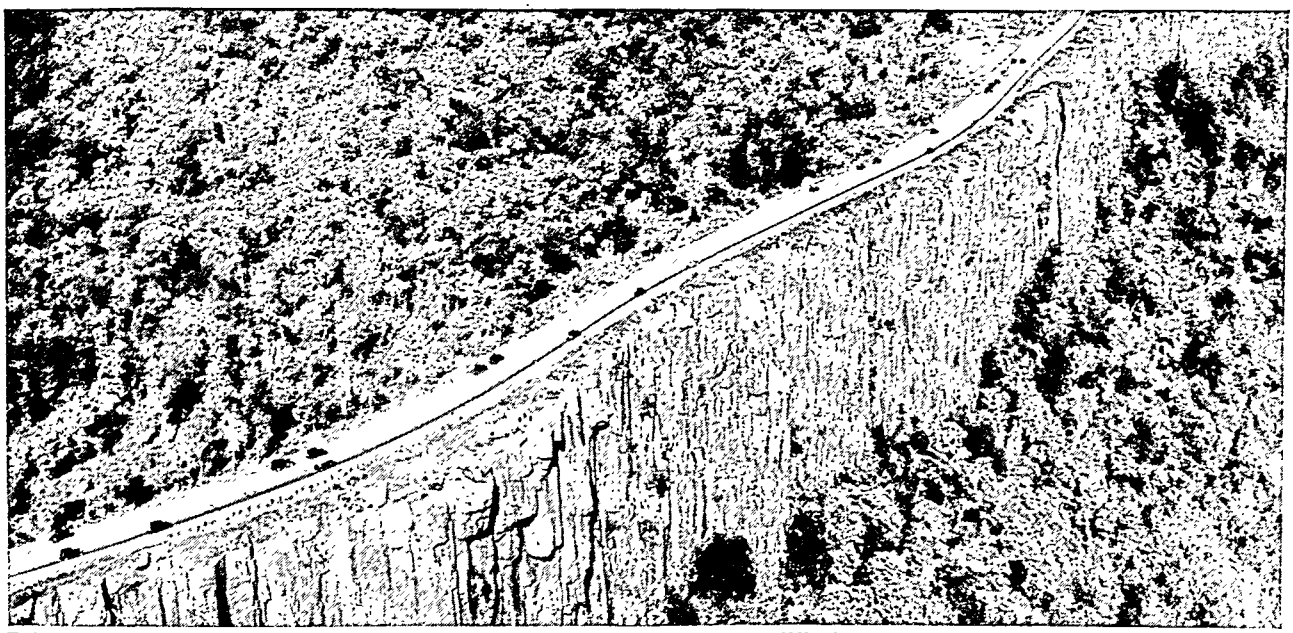
With its long seacoast and with the Delaware and Hudson rivers along its borders, New Jersey has a large fishing industry. Along the coast and in Delaware Bay there are about 15,000 acres of productive oyster beds.

New Jersey does not rank high among the states in the total value of its mineral production. Its chief minerals are zinc, iron ore, sand and gravel, and stone. The state also produces a variety of clays.

A Leading Manufacturing State

Although tiny in size, New Jersey is one of the most important manufacturing states in the Union, both in the variety and quantity of its manufactured

THE FAMOUS PALISADES OF THE HUDSON RIVER



This view by Fairchild Aerial Survey shows United States Highway 9W atop the Palisades in northeastern New Jersey. Far below the scenic highway, at the right, lies the Hudson River.

The great cliff of the Palisades parallels the Hudson for almost 20 miles north of Weehawken. It contains stretches of basaltic rock broken into the interesting columns we see here.

goods. It ranks seventh among the states in the value of its manufactures. Manufacturing is the leading industry in the state and employs the most workers.

The ideal location of New Jersey largely accounts for its importance in industry. Situated between the financial and commercial giants, New York City and Philadelphia, it is a crossroads of commerce. Besides important markets, it has excellent railroads, highways, and waterways, with outstanding ports in the Newark area and at Camden and Trenton.

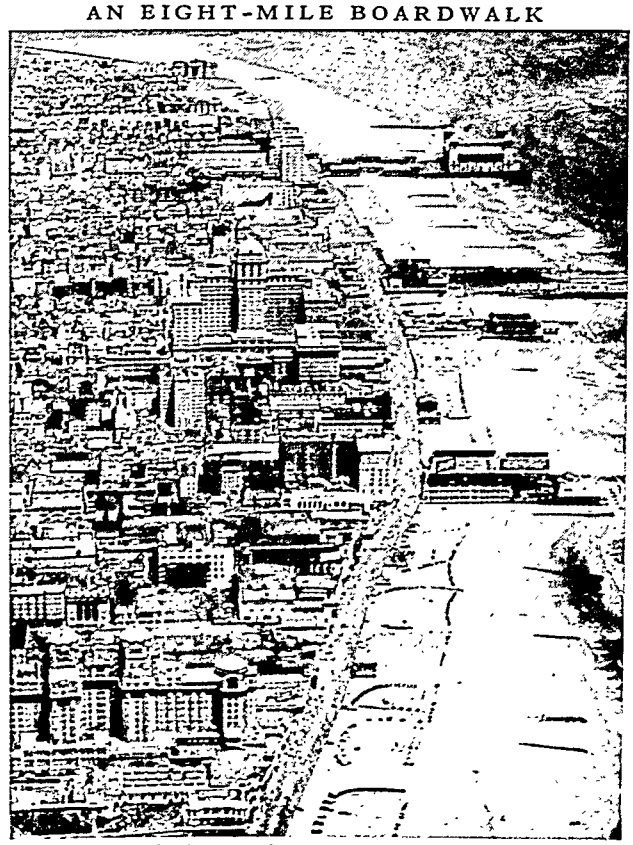
The 118-mile New Jersey Turnpike, completed in 1952, speeds traffic from George Washington Bridge over the Hudson in the northeast to the Memorial Bridge over the Delaware, south of Wilmington. An express route from Trenton to the north is the Trenton Expressway. Other major roads are being built. An interconnection will link the New Jersey Turnpike with the Pennsylvania Turnpike from Florence, N. J., to Edgely, Pa., by way of a new Delaware River bridge. The Garden State Parkway will run between Paramus and Cape May along the east side of the state. The Palisades Interstate Parkway will connect the George Washington Bridge with Bear Mountain, N.Y., paralleling the Hudson in New Jersey.

Ample supplies of fuel and raw materials are easily available. Coal for its factories and for its steam-electric power plants comes from the coal-mining areas of nearby Pennsylvania. Petroleum and natural gas are piped from the mid-continent fields of Texas and Oklahoma. Most of the materials for manufacturing come from other states, particularly Pennsylvania.

New Jersey surpasses all states in the production of chemicals, its largest industry. This includes industrial chemicals, drugs and medicines. Other important industries make electrical and industrial machinery, food products, and textiles.

The center of New Jersey's industrial area is Newark, with Jersey City, Paterson, Elizabeth, and Bayonne nearby. Other concentrations of industry center around Camden and Trenton.

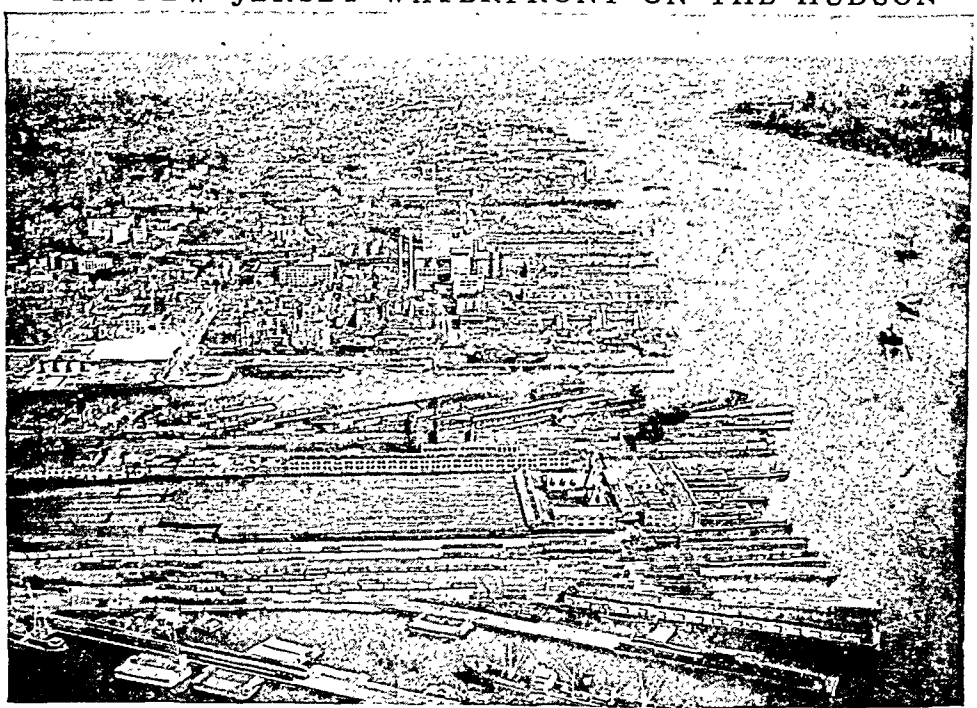
AN EIGHT-MILE BOARDWALK



One of the nation's most famous resorts is Atlantic City. The beach and boardwalk attract millions of visitors every year. Rolling chairs on the eight-mile-long boardwalk are popular.

Newark, largest of all, is said to have more different kinds of factories than any other city of its size in the nation (*see* Newark). Its factories turn out hundreds of different types of products. In addition, the city is a great transportation center, lying across main railroads and highways from New York City to the west and the south. Two federal highways have a by-pass just east of Newark over the great General Pulaski Skyway. This towering series of steel bridges, about three and one-half miles long, carry motor vehicles from the west and south over marshes and the Passaic and Hackensack rivers to the Holland Tunnel and New York City.

THE NEW JERSEY WATERFRONT ON THE HUDSON



The busy piers of Jersey City and Hoboken face Manhattan Island across the Hudson River. Ships carry heavy cargoes from these piers to ports throughout the world. In the foreground of this view by Fairchild Aerial Surveys is a railroad station with its train shed and ferry slips. Ferries cross the river day and night carrying passengers and freight cars.

About six miles east of Newark is Jersey City. Its busy port transfers freight cars to and from New York ferries and loads ocean-going ships. The Holland Tunnel and railways through the Hudson tubes provide transportation to New York. The city manufactures many different products (*see* Jersey City).

Paterson, 15 miles north of Newark, also produces a variety of goods (*see* Paterson). Five miles south of Newark is Elizabeth, a busy industrial city along Newark Bay. Its manufactures include refined petroleum, sewing machines, and automobiles. Goethals Bridge connects the city with Staten Island, N. Y. (*see* Elizabeth). Orange is a residential suburb north of Newark with many small factories and offices of insurance companies.

Bayonne has enormous petroleum refineries. This city is the eastern terminal of oil pipe lines that extend as far west as the Texas and Oklahoma fields. The city lies on a long peninsula which separates Newark Bay from Upper New York Bay. Its southern tip is separated from Staten Island by the narrow channel, Kill van Kull. It is spanned by the high-arched Bayonne Bridge, the longest steel arch span in the world.

Southwest across the state from Newark is Trenton, state capital and important manufacturing city (*see* Trenton). It is located on the Delaware River only 34 miles from Philadelphia. Its factories turn out many kinds of goods. It is particularly noted for its manufacture of pottery, steel wire, and cables.

The giant Delaware River Bridge joins Camden and Philadelphia. Camden is miles from the sea, but ships leave its docks on the Delaware and Cooper rivers to call at Baltimore and other ports on the Atlantic and Pacific oceans. Camden factories make canned soup, ships, radios, and chemicals (*see* Camden).

Excellent Schools

New Jersey has more than 30 institutions of higher education. Outstanding among the universities are Princeton and Rutgers. Since colonial times, Princeton has shared a venerable tradition with Yale and Harvard. Rutgers University at New Brunswick is the nation's eighth oldest school of higher learning. It heads the state-supported colleges. One of these is the New Jersey College for Women, on a separate campus in the southeastern part of New Brunswick. Three colleges in Newark, teaching business administration, law, and pharmacy, are also part of Rutgers. The Newark College of Engineering is partially state-supported. There are also six state-supported teachers colleges at Trenton, Montclair, Newark, Glassboro, Jersey City, and Paterson.

The State Government

New Jersey's original Constitution was drafted in 1776. Its second constitution was adopted in 1844, and the present one in 1948. Under the last, the state legislature is made up of a senate elected for a four-year term and a general assembly elected for a two-year term. The governor serves a four-year term.

For many years New Jersey had a liberal policy toward corporations incorporated within the state.

Continued on page 167

New Jersey Fact Summary

NEW JERSEY (N. J.): Named after the island of Jersey (Caesarea) in English Channel. The province was granted to Carteret, who defended Jersey during the Civil War in England, and to Lord Berkeley in 1664.
Nickname: "Garden State," from its many truck farms.
Seal: 3 plows on shield supported by Liberty and Ceres; helmet, horse's head above shield; motto below shield.
Motto: Liberty and Prosperity.
Flag: For description and illustration, *see* Flags.
Flower: Purple violet. Bird: Eastern goldfinch. Tree: Red oak. Song (unofficial): 'Ode to New Jersey'—words, Elias F. Carr; music, to tune of 'O Tannenbaum'.

THE GOVERNMENT



Capital: Trenton (since 1790).
Representation in Congress: Senate, 2; House of Representatives, 14. Electoral votes, 16.
State Legislature: Senators, 21; term, 4 years. General Assembly members, 60; term, 2 years. It convenes the second Tuesday in January every year. There is no limit to the length of sessions.
Constitution: Adopted 1948. Proposed amendment must be (a) passed by a three-fifths vote of the legislature or by a majority vote in 2 successive legislative years and (b) ratified by a majority voting on amendment; if rejected by voters it may not be proposed again until the third general election thereafter.
Governor: Term, 4 years. May succeed himself once; and may be re-elected after a 4-year interval.
Other Executive Officers: Secy. of state, atty. gen., treasr. appointed by governor (with Senate approval); terms, 4 yrs. but treasr. holds office at governor's pleasure; auditor appointed by legislature; term, 5 yrs.
Judiciary: All judges appointed by governor with Senate approval. Supreme ct.—7 justices. Superior ct.—at least 24 judges. Judges of both courts serve one term of 7 yrs.; if reappointed, hold office until 70 yrs. old. County courts—1 in each county; term, 5 yrs.
County: 21 counties, each governed by a board of Chosen Freeholders, usually of 5 members. Boards and officers elected; term, 3 years.
Municipal: Mayor-council, commission, or city manager.
Voting Qualifications: Age, 21; residence in state, 1 year; in county, 5 months.



TRANSPORTATION AND COMMUNICATION

Transportation: Railroads, 2,000 miles. First railroad, Camden to South Amboy, 1834. Rural roads, 18,400 miles. Airports, 78.
Communication: Periodicals, 139. Newspapers, 314. First newspaper, *Constitutional Courant* (one issue only), Woodbridge, 1765; *New York Gazette*, Newark, 1776. Radio stations (AM and FM), 32; first station, WJZ, Newark, licensed June 1, 1921 (now in New York). Television stations, 3; WATV, Newark, began operation May 15, 1948. Telephones, 1,989,000. Post offices, 627.

THE PEOPLE AND THEIR LAND

Population (1950 census): 4,835,329 (rank among 48 states—8th); urban, 86.6%; rural, 13.4%. Density: 642.8 persons per square mile (rank—2d state).
Extent: Area, 7,836 miles, including 314 square miles of water surface (45th state in size).
Elevation: Highest, High Point, 1,801 feet, in Kittatinny Mountains near Colesville; lowest, sea level.
Temperature (°F.): Average—annual, 52°; winter, 32°; spring, 50°; summer, 72°; fall, 55°. Lowest recorded, −34° (Rivervale, near Hillsdale, Jan. 5, 1904); highest recorded, 110° (Runyon, Middlesex County, July 10, 1936).
Precipitation: Average (inches)—annual, 46; winter, 11; spring, 11; summer, 13; fall, 11. Varies from about 40 in s.e. to about 48 in n. central and s. central.
Natural Features: Five almost parallel sections cross the state diagonally. In the northwest are the Kittatinny Mts., southeast of which lies a wide valley. The Highlands come next. Still farther southeast is the Piedmont Plateau. At the extreme southeast the Coastal Plain covers about one half of the state. Principal Rivers: Delaware, Great Egg, Hackensack, Hudson, Maurice, Mullica, Passaic, Raritan, Toms.
Land Use: Cropland, 19%; nonforested pasture, 6%; forest, 49%; other (roads, parks, game refuges, wasteland, cities, etc.), 26%.



Natural Resources: *Agricultural*—areas of good soil; ample precipitation. *Industrial*—salt- and fresh-water fish, forests, zinc, stone, iron ore, clay, sand and gravel, marl (used as water-softening agent). *Commercial*—navigable rivers to inland industrial centers; location near metropolitan markets; lake and seaside resorts.

OCCUPATIONS AND PRODUCTS

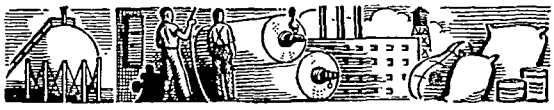
What the People Do to Earn a Living



Major Industries and Occupations, 1950

Fields of Employment	Number Employed	Percentage of Total Employed
Manufacturing	739,860	37.8
Wholesale and retail trade	350,971	17.9
Transportation, communication, and other public utilities	163,332	8.3
Professional services (medical, legal, educational, etc.)	149,865	7.6
Construction	121,897	6.2
Personal services (hotel, domestic, laundering, etc.)	109,426	5.6
Finance, insurance, and real estate	98,659	5.0
Government	80,887	4.1
Agriculture, forestry, and fishery	51,779	2.6
Business and repair services	51,056	2.6
Amusement, recreation, and related services	16,178	0.8
Mining	4,062	0.2
Workers not accounted for	24,660	1.3
Total employed	1,962,632	100.0

New Jersey Fact Summary



What the People Produce

A. Manufactured Goods (Rank among states—7th)
Value added by manufacture* (1952), $5,764,365,000

Leading Industries in 1947 (with Principal Products)	Value Added by Manufacture	Rank among States
CHEMICALS AND ALLIED PRODUCTS... Industrial chemicals; drugs and medicines; toilet preparations	$744,601,000	1
ELECTRICAL MACHINERY..... Telephone and telegraph equipment; radios, related products.....	393,992,000	5
FOOD AND KINDRED PRODUCTS..... Malt liquors; canned fruits, vegetables, and soups; bakery goods	354,821,000	7
MACHINERY (EXCEPT ELECTRICAL)... General industrial machinery; special-industry machinery; service and household machines	334,610,000	10
TEXTILE MILL PRODUCTS..... Finishing textiles; woolen and worsted fabrics; carpets and rugs	326,239,000	7

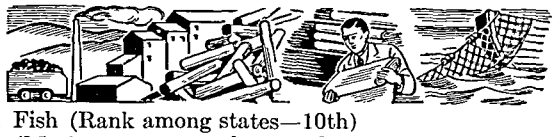
*For explanation of value added by manufacture, *see* Census.



B. Farm Products (Rank among states—35th)
Total cash income (1952), $347,497,000

Products	Amount Produced (10-Year Average)	Rank within State*	Rank among States†
Milk.....	485,000,000 qts.	1	31
Eggs.....	98,000,000 doz.	2	16
Truck crops....	556,000 tons	3	7
Chickens.....	64,944,000 lbs.	4	25
Potatoes.....	11,213,000 bu.	5	11
Corn.....	7,816,000 bu.	6	31
Hay.....	426,000 tons	7	44
Cattle.....	33,910,000 lbs.	8	43
Hogs.....	30,099,000 lbs.	9	37
Sweet potatoes..	2,185,000 bu.	10	10

*Rank in dollar value †Rank in units produced



C. Fish (Rank among states—10th)
(Marine waters and coastal rivers, 1950), catch, 188,623,000 lbs.; value, $10,201,000

D. Minerals (Fuels, Metals, and Stone)
Annual value (1951), $59,024,000
Rank among states—29th

Minerals (1951)	Amount Produced	Value
Zinc.....	63,000 tons	$24,280,000
Stone.....	6,457,000 tons	10,988,000
Sand and gravel..	6,652,000 tons	9,106,000
Iron ore.....	658,000 tons	7,811,000
Clays.....	683,000 tons	2,107,000

E. Trade

Trade (1948)	Sales	Rank among States
Wholesale.....	$3,629,810,000	11
Retail.....	4,479,205,000	8
Service.....	486,728,000	8

EDUCATION



Public Schools: Elementary, 1,522; secondary, 270. Compulsory school age, 7 through 15. State Board of Education composed of 12 members appointed by governor for 6-year terms. State commissioner of education appointed by governor for 5-year term. County supts. appointed by state commissioner for 3-year terms. Local school boards generally elected, although appointed by mayor in certain cities. City supts. appointed by city boards.

Private and Parochial Schools: 488.

Colleges and Universities (accredited): Colleges, 39; junior colleges, 10. Rutgers University, which is state supported, includes the New Brunswick Campus (for men), New Jersey College for Women, New Brunswick, and the Newark Colleges. Newark College of Engineering is also partially state supported. There are 6 state-supported teachers colleges—Trenton, Montclair, Newark, Glassboro, Jersey City, and Paterson.

Special State Schools: School for the Deaf, West Trenton; Manual Training and Industrial School, Bordentown.

Libraries: City and town public libraries, 299; independent county library systems, 12. Dept. of Education responsible for developing libraries. Work headed by Public and School Library Services Bureau, Div. of State Library, Archives and History, State Dept. of Education.

Outstanding Museums: Monmouth Co. Historical Association, Freehold; Montclair Art Museum; Newark Museum; Museum of Natural History, Paterson; Museum of Art, Princeton; State Museum, Trenton.

WELFARE INSTITUTIONS FOR CHILDREN

For boys: New Lisbon Colony, New Lisbon; Woodbine Colony, Woodbine. *For girls:* North Jersey Training School, Totowa; Vineland State School, Vineland. *For boys and girls:* Arthur Brisbane Child Treatment Center, Allaire.

CORRECTIONAL AND PENAL INSTITUTIONS

For boys: Highfields, Hopewell; State Home for Boys, Jamesburg. *For girls:* State Home for Girls, Trenton. *For men:* State Prison, Trenton, and 2 branches—Prison Farms at Leesburg and Rahway. Reformatories at Bordentown and Annandale. *For women:* Reformatory at Clinton.

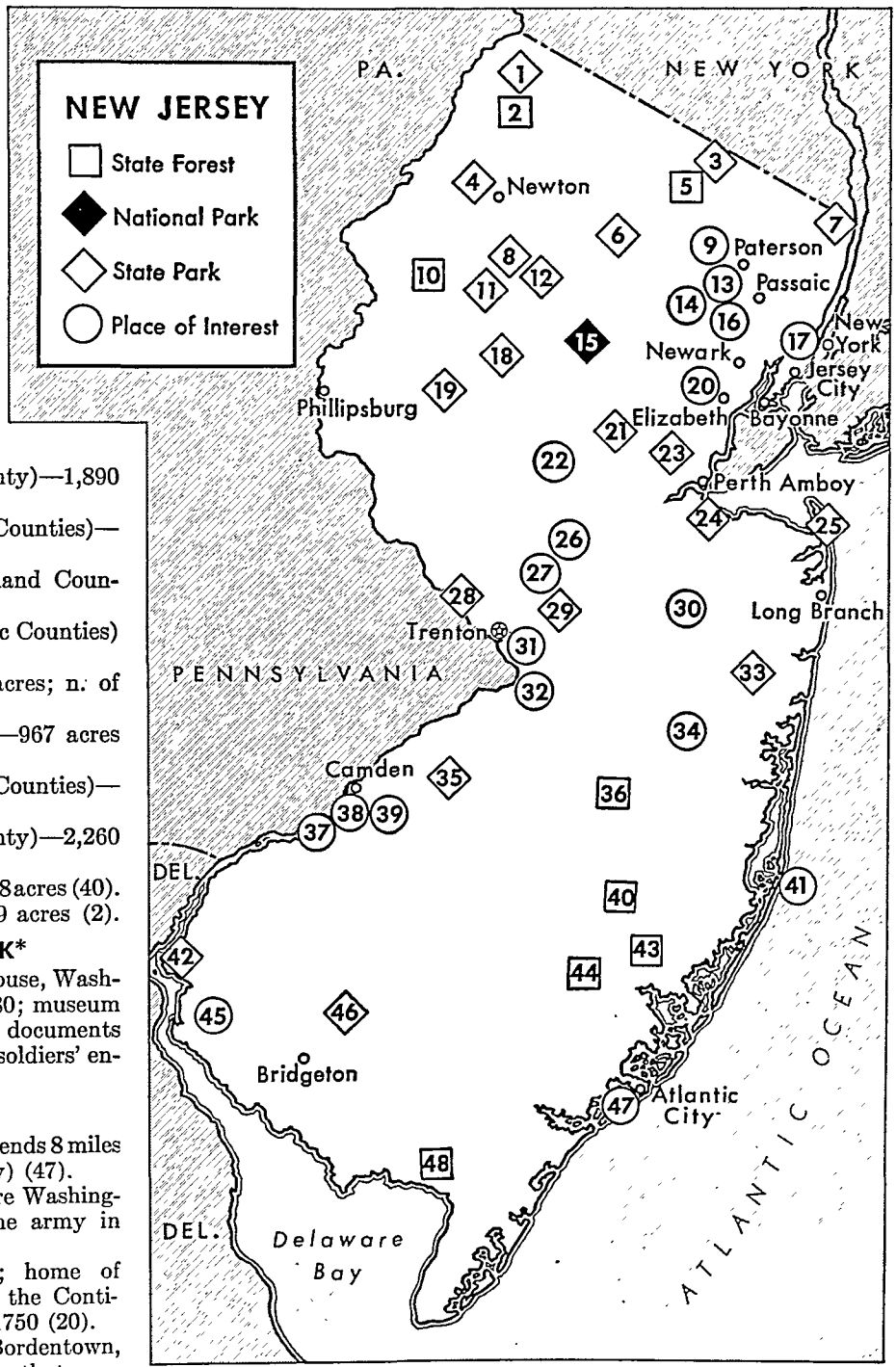
STATE PARKS*

Barnegat Light—famous old lighthouse; at symbol (41).
Cheesequake—forested park near Raritan Bay (24).
Edison—Menlo Park; Memorial Tower on site of laboratory where Edison invented incandescent bulb (23).
Hacklebarney—in scenic gorge of Black River (18).
High Point—along Kittatinny Mountains; panoramic view of New Jersey, New York, and Pennsylvania (1).
Hopatcong—bathing and fishing at Hopatcong Dam (12).
Musconetcong—water sports on Lake Musconetcong (12).
Palisades Interstate—extends into N. Y.; majestic rock columns (palisades) rise above Hudson River (7).
Parvin—woodland of pine and oak; abundance of flowering plants and wide variety of bird life (46).
Ringwood Manor—150-year-old manor once owned by Cooper-Hewitt family; now a museum (3).
Saxton Falls—lock of old Morris Canal; bathing (11).
Stephens—scenic mile along Musconetcong River (11).
Swartswood—in foothills of the Kittatinny Mts. (4).

*Numbers in parentheses are keyed to map.

New Jersey Fact Summary

Voorhees—scenic hills (19).
Washington Crossing—commemorates Washington's crossing of Delaware River near Trenton, Dec. 25, 1776; Old McKonkey Ferry House now a museum (28).
Washington Rock—Dunellen; rock from which Washington watched British troops during Revolutionary War (21).
Allaire (33); Cranberry Lake (8); Farny (6); Fort Mott (42); Mount Laurel (35); Princeton Battlefield (29); Sandy Hook (project) (25).



STATE FORESTS*

Abram S. Hewitt (Passaic County)—1,890 acres; n.w. of (5).
Bass River (Burlington-Ocean Counties)—9,270 acres (43).
Belleplain (Cape May-Cumberland Counties)—6,492 acres (48).
Green Bank (Burlington-Atlantic Counties)—1,833 acres (44).
Jackson (Ocean County)—43 acres; n. of (36).
Jenny Jump (Warren County)—967 acres (10).
Lebanon (Burlington-Ocean Counties)—22,185 acres (36).
Norvin Green (Passaic County)—2,260 acres (5).
Penn (Burlington County)—2,958 acres (40).
Stokes (Sussex County)—12,429 acres (2).

NATIONAL HISTORICAL PARK*

Morristown—958 acres; Ford House, Washington's headquarters, 1779–80; museum contains Revolutionary War documents and exhibits; Jockey Hollow, soldiers' encampment (15).

PLACES OF INTEREST*

Atlantic City—"boardwalk" extends 8 miles along beach (*see* Atlantic City) (47).
Berrien House—Rocky Hill; here Washington wrote his farewell to the army in 1783 (26).
Boudinot Mansion—Elizabeth; home of Elias Boudinot, president of the Continental Congress, built about 1750 (20).
Clara Barton Schoolhouse—Bordentown, one of the first free schools that was opened by the founder of the American Red Cross (32).
Dey Mansion—Washington's headquarters, near Paterson, in 1780; now a museum (9).
Grover Cleveland Birthplace—in Caldwell (14).
Hancock House—built at Hancock's Bridge, 1734; N.J. militia massacred here by British troops, 1778 (45).
Indian King Tavern—in Haddonfield; famous Revolutionary War meeting place built in 1750; first state legislature met here in 1777 (39).
Jersey City—across Hudson River from New York City; New Jersey's 2d largest city (*see* Jersey City) (17).
Lakehurst—U. S. Naval Air Station; huge hangars for lighter-than-air craft; Cathedral of the Air (34).
Monmouth Battlefield—near Freehold; where Molly Pitcher took her husband's battle post (30).
Newark—state's largest city (*see* Newark) (16).
Paterson—the museum and West Side Park each exhibit a submarine built by J. P. Holland (*see* Paterson) (13).
Princeton—historic campus and buildings of Princeton University; 50-ft. Princeton Battle Monument (27).
Red Bank Battlefield—site of Fort Mercer, attacked by Hessian troops and British fleet in 1777 (37).
Somerville—Old Dutch Parsonage (1751); Wallace House where Washington stayed 1778–79 (22).
Trenton—many places including State Capitol, Old Barracks (1758), Battle Monument (*see* Trenton) (31).
Walt Whitman House—the poet's home in Camden (38).

*Numbers in parentheses are keyed to map.

New Jersey Fact Summary

LARGEST CITIES (1950 census)

Newark (438,776): busy transportation center near New York City; insurance companies; makes electrical equipment, jewelry, paints and varnishes.

Jersey City (299,017): Hudson River rail-ship terminal for New York City; large manufacturing industries.

Paterson (139,336): important industrial and commercial city on Passaic River; manufactures many products.

Trenton (128,009): state capital; Delaware River port; large potteries; steel wire and cable; rubber goods.

Camden (124,555): port on Delaware River; shipyards.

Elizabeth (112,817): industrial city near Newark; sewing machines; petroleum products; automobile parts.

East Orange (79,340): residential suburb of Newark.

THE PEOPLE BUILD THEIR STATE



1524—Giovanni da Verrazano, in service of France, explores Upper New York Bay, including shore of what is now New Jersey.

1609—Henry Hudson explores river named for him.

1618—Dutch trading post built at Bergen, now Jersey City.

1623—Captain Cornelius Mey establishes Fort Nassau near present Gloucester City.

1629—Michael Pauw receives land grant near present Jersey City; Cornelius van Vorst develops colony.

1638—Swedish settlers build forts on east bank of Delaware River; expelled by Dutch, 1655.

1661—First school established at Bergen.

1664—England takes over New Netherland from Dutch; Charles II of England grants area including New Jersey to Duke of York; Duke grants area to Lord Berkeley and Sir George Carteret. Philip Carteret, cousin of Sir George, named first governor.

1668—First colonial assembly meets at Elizabethtown, later Elizabeth.

1670—Colonists agitate against proprietary government; refuse to pay rents to proprietors.

1672—Colonists meet at Elizabethtown; replace Philip Carteret as governor with James Carteret.

1673—Dutch retake part of New Jersey; land restored to England by Treaty of Westminster, 1674.

1674—Philip Carteret returns as governor. Edward Byllynge and John Fenwick, Quakers, buy Berkeley's interest in western New Jersey. Edmund Andros becomes governor of New York with authority over New Jersey; action provokes dispute ending in independent rule for New Jersey.

1676—Colony divided into East and West Jersey; William Penn receives western part in trust.

1677—Burlington, settled by Quakers, becomes capital of West Jersey.

1682—East Jersey put up for auction; Penn and associates buy the land and resell it to colonists.

1686—Perth Amboy chosen capital of East Jersey.

1702—East and West Jersey surrender government to English Crown; New Jersey becomes royal colony ruled by governor of New York.

1738—New Jersey separated from New York; Lewis Morris is first governor of colony.

1740—First glass factory in colony built near Salem.

1746—College of New Jersey (now Princeton University) chartered; opens first at Elizabeth; moves to Newark, 1748; then to Princeton, 1756.

1766—Queens College founded at New Brunswick; becomes Rutgers, 1825 and state university, 1917.

1774—First Provincial Congress meets at New Brunswick; chooses delegates to Continental Congress; adopts state declaration of independence and constitution, 1776; first governor, William Livingston. Greenwich men burn shipload of English tea.

1776—Washington retreats across state into Pennsylvania, recrosses Delaware River, takes Trenton.

1777—Americans defeat British at Princeton, January 3; General Howe withdraws from state.

1778—British retreat across New Jersey from Philadelphia; Washington defeats them at Monmouth.

1779—Washington and army winter at Morristown.

1783—Princeton is national capital, June 30–November 4; Trenton, capital, Nov. 1–Dec. 24, 1784; Washington gives farewell address to army at Rocky Hill.

1786—New Jersey is one of five states at Annapolis Convention. State grants John Fitch steamship rights; tries out first craft on Delaware River, 1787.

1787—New Jersey ratifies U. S. Constitution (3d state).

1790—Trenton becomes permanent state capital. Women given suffrage right; right withdrawn, 1807.

1791—Alexander Hamilton plans factory city on site of Paterson; calico printing plant opens, 1794.

1804—Alexander Hamilton killed in duel with Aaron Burr at Weehawken. New Jersey's first bank, the Newark Banking Company, chartered.

1811—John Stevens opens first steam ferry between Hoboken and New York City.

1824—Morris Canal begun; opens, 1831.

1834—Delaware and Raritan Canal opened.

1844—New state constitution adopted, August 13; grants free male suffrage and bill of rights.

1869—Thomas A. Edison opens first workshop at Newark.

1871—State-wide free public-school system established.

1875—First Bayonne oil refinery opened.

1879—Edison demonstrates first practical electric lamp at Menlo Park laboratory.

1881—John P. Holland launches first successful submarine in Passaic River.

1885—Grover Cleveland, born at Caldwell, becomes 22d president of the U. S., and the 24th in 1893.

1889—Legislature enacts first of several liberal corporation laws attracting businesses into state.

1908—First (railroad) tunnel under Hudson River between Jersey City and New York opened.

1913—"Seven Sisters" laws against monopolies enacted. Woodrow Wilson, former president of Princeton University, and governor of New Jersey, 1911–13, becomes 28th president of U. S.

1916—"Black Tom" explosion on Jersey City water front, July 30, caused by German sabotage.

1921—Port of New York Authority established by treaty between New Jersey and New York.

1927—Holland Tunnel opened. George Washington Bridge opened, 1931; Lincoln Tunnel, 1937.

1928—Newark Airport opened.

1930—Inst. for Advanced Study founded at Princeton.

1933—Pulaski Skyway, Jersey City to Newark, opened.

1948—Present state constitution adopted.

1951—Delaware Memorial Bridge opened.

1952—New Jersey Turnpike completed. Newark airport temporarily closed after 3d crash. Delaware River Port Authority of New Jersey and Pennsylvania created for Camden-Philadelphia area.

1953—Army Signal Corps laboratories at Fort Monmouth near Red Bank figures in Senate Investigations hearings of Sen. Joseph McCarthy.

1954—Sections of Garden State Parkway completed.

NEW JERSEY

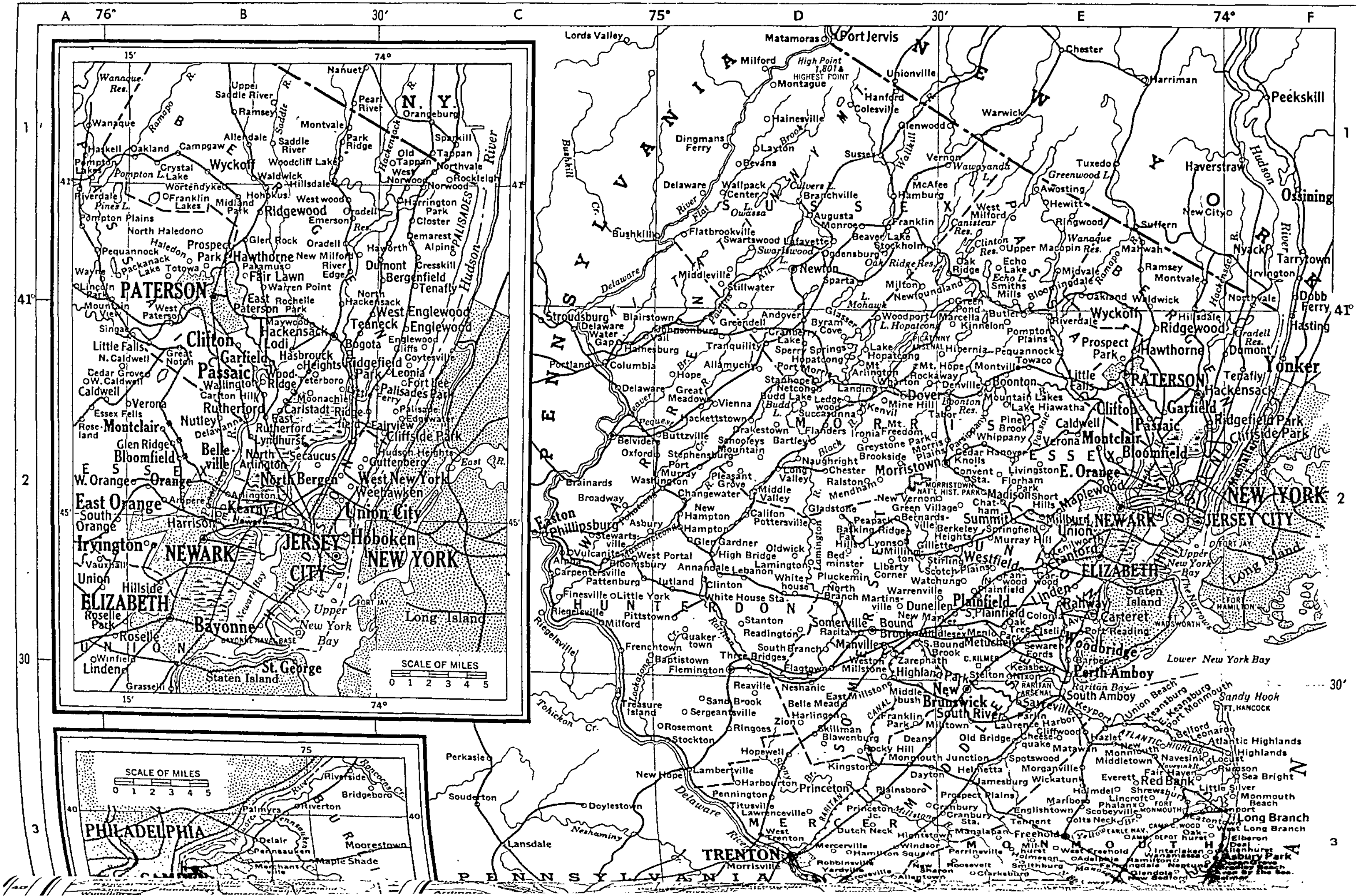
COUNTIES

Atlantic	132,399	D 5
Bergen	539,139	E 2
Burlington	135,910	D 4
Camden	300,743	D 4
Cape May	37,131	D 5
Cumberland	88,597	C 5
Essex	905,949	E 2
Gloucester	91,727	C 4
Hudson	647,437	E 2
Hunterdon	42,736	D 2
Mercer	229,781	D 3
Middlesex	264,872	E 3
Monmouth	225,327	E 3
Morris	164,371	D 2
Ocean	56,622	E 4
Passaic	337,093	E 1
Salem	49,508	C 4
Somerset	99,052	D 2
Sussex	34,423	D 1
Union	398,138	E 2
Warren	54,374	C 2

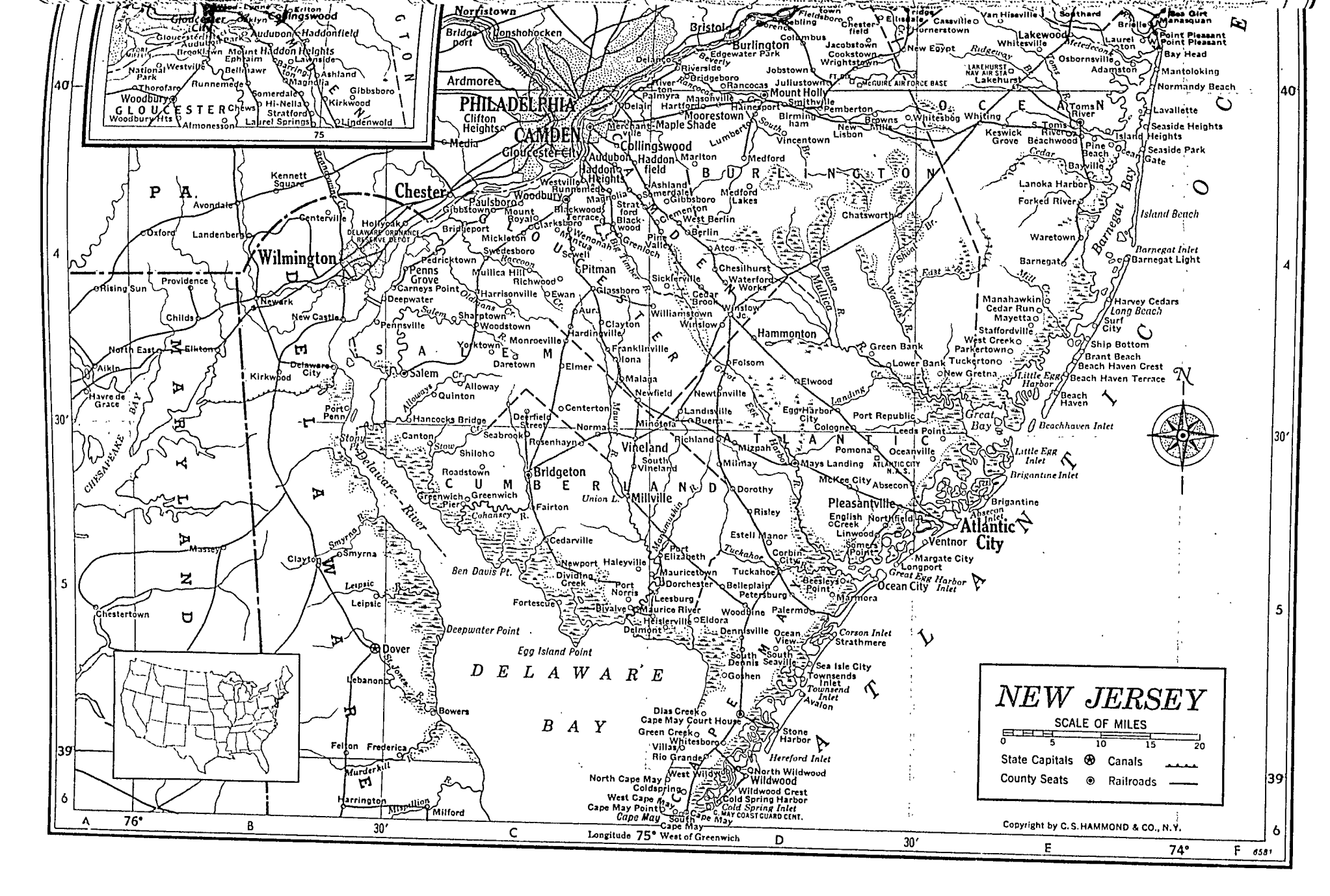
CITIES AND TOWNS

Absecon	2,355	D 5
Adamston	450	E 3
Adelphia	300	E 3
Allamuchy	600	D 2
Allendale	2,409	B 1
Allenhurst	758	F 3
Allentown	931	D 3
Allenwood		E 3
Alloway	700	C 4
Almonesson		B 4
Alpha	2,117	C 2
Alpine	644	C 1
Ampere	10,000	B 2
Andover	560	D 2
Annandale		D 2
Arlington	16,000	B 2
Asbury	300	C 2
Asbury Pk.	17,094	F 3
Ashland	1,240	D 4
Atco	2,500	D 4
Atlantic City	61,657	E 5
Atlantic Highlands	3,083	F 3
Audubon	9,531	C 4
Audubon Pk.	1,859	B 3
Augusta	80	D 1
Aura	100	C 4
Avalon	428	D 5
Avenel	8,700	E 2
Avon by the Sea	1,650	F 3
Awosting		E 1
Baptistown	350	D 2
Barber		E 2
Barnegat	1,150	E 4
Barnegat Light	227	E 4
Barrington	2,651	B 3
Bartley	500	D 2
Basking Ridge	1,899	D 2
Bay Head	808	E 3
Bayonne	77,203	B 2
Bayville	2,000	E 4
Beach Haven	1,050	E 4
Beach Haven Crest		E 4
Beach Haven Terrace	350	E 4
Beachwood	1,251	E 4
Beaver Lake	175	D 1
Bedminster	650	D 2
Beesleys Point	300	D 5
Belford	1,832	E 3
Belle Mead	650	D 3
Belleplain	700	D 5
Belleville	32,019	E 2
Bellmawr	5,213	B 3
Belmar	4,636	E 3
Belvidere	2,406	C 2
Bergenfield	17,647	C 1
Berkeley Hts.	3,460	E 2
Berlin	2,339	D 4
Bernardsville	3,956	D 2
Bevans		D 1
Beverly	3,084	D 3
Birmingham	250	D 4
Bivalve		C 5
Blackwood	1,344	C 4
Blackwood Terrace	2,100	C 4
Blairstown	875	C 2
Blawenburg	200	D 3
Bloomfield	49,307	B 2
Bloomingdale	3,251	E 1
Bloomsbury	722	C 2
Bogota	7,662	B 2
Boonton	7,163	E 2
Bordentown	5,497	D 3
Bound Brook	8,374	D 2
Bradley Beach	3,911	F 3
Brainards	350	C 2
Branchville	810	D 1
Brant Beach		E 4
Bridgeboro	750	D 3
Bridgeport	650	C 4
Bridgeton	18,378	C 5
Brielle	1,328	E 3
Brigantine	1,267	E 5
Broadway	250	C 2
Brooklawn	2,262	B 3
Brookside		D 2
Browns Mills		D 4
Budd Lake	1,032	D 2
Buena	2,640	D 4
Burlington	12,051	D 3
Butler	4,050	E 2
Buttzville	300	D 2
Byram Cove		D 2
Caldwell	6,270	E 2
Califon	623	D 2
Camden	124,555	C 4
Campgaw		B 1
Canton	300	C 5
Cape May	3,607	D 6
Cape May Court House	1,093	D 5
Cape May Point	198	D 6
Carlstadt	5,591	B 2
Carlton Hill	1,000	B 2
Carneys Pt.	4,000	C 4
Carpentersville		C 2
Carteret	13,030	E 2
Cassville		E 3
Cedar Brook	600	D 4
Cedar Grove	7,723	A 2
Cedar Knolls	1,500	E 2
Cedar Run	260	E 4
Cedarville	1,009	C 5
Centerton	200	C 4
Changewater	225	D 2
Chatham	7,391	E 2
Chatsworth	350	D 4
Cheesequake	300	E 3
Chesilhurst	314	D 4
Chester	754	D 2
Chesterfield	500	D 3
Chews	1,500	B 4
Clarksboro	800	C 4
Clarksburg	500	E 3
Clayton	3,023	C 4
Clementon	3,191	D 4
Cliffside Pk.	17,116	F 2
Cliffwood	1,800	E 3
Clifton	64,511	E 2
Clinton	1,118	D 2
Closter	3,376	C 1
Cold Spring	100	D 6
Cold Spring Harbor	25	D 6
Colesville	150	D 1
Collingswood	15,800	C 4
Cologne	672	D 4
Colonia		E 2
Colts Neck	200	E 3
Columbia	300	C 2
Columbus	600	D 3
Convent Station		E 2
Cookstown	450	D 3
Corbin City	238	D 5
Coytesville	2,500	C 2
Cranberry L.	200	D 2
Cranbury	1,843	E 3
Cranbury Sta.		E 3
Cranford	†18,602	E 2
Creamridge	50	E 3
Cresskill	3,534	C 1
Crosswicks	850	D 3
Crystal Lake		B 1
Daretown	150	C 4
Dayton	450	D 3
Deal	1,064	F 3
Deans	300	D 3
Deepwater	1,500	C 4
Deerfield St.	500	C 4
Delair	2,237	C 4
Delanco	2,494	D 3
Delawanna	4,000	B 2
Delaware	279	C 2
Delmont	330	C 5
Demarest	1,786	C 1
Dennisville	300	D 5
Denville	4,200	E 2
Dias Creek	400	D 5
Dividing Cr.	900	C 5
Dorchester	235	D 5
Dorothy	400	D 5
Dover	11,174	D 2
Drakestown	100	D 2
Dumont	13,013	F 2
Dunellen	6,291	D 2
Dutch Neck	150	D 3
E. Keansburg	2,596	E 3
E. Millstone		D 3
E. Newark	2,173	B 2
E. Orange	79,340	B 2
E. Paterson	15,386	B 2
E. Rutherford	7,438	B 2
Eatontown	3,044	E 3
Echo Lake		E 1
Edgewater	3,952	C 2
Edgewater Pk.	150	D 3
Egg Harbor City	3,838	D 4
Elberon	1,200	E 3
Eldora	350	D 5
Elizabeth	112,817	E 2
Ellisdale	60	D 3
Elmer	1,460	C 4
Elwood	600	D 4
Emerson	1,744	B 1
Englewood	23,145	C 2
Englewood Cliffs	966	C 2
English Creek	350	D 5
Englishtown	1,004	E 3
Erlton	2,000	B 3
Essex Fells	1,617	A 2
Estell Manor	381	D 5
Everett	100	E 3
Ewan	240	C 4
Fair Haven	3,560	E 3
Fair Lawn	23,885	B 1
Fairton		C 5
Fairview	8,661	C 2
Fanwood	3,228	E 2
Far Hills	600	D 2
Farmingdale	755	E 3
Fieldsboro	589	D 3
Finesville	275	C 2
Flagtown	450	D 2
Flanders	450	D 2
Flatbrookville		D 1
Flemington	3,058	D 2
Florence	3,460	D 3
Florham Pk.	2,385	E 2
Folsom	292	D 4
Fords	5,200	E 2
Forked River	1,000	E 4
Fort Lee	11,648	C 2
Fortescue	500	C 5
Franklin	3,864	D 1
Franklin Lakes	2,021	B 1
Franklin Park	715	D 3
Franklinville	1,226	C 4
Freehold	7,550	E 3
Frenchtown	1,305	C 2
Garfield	27,550	E 2
Garwood	4,622	E 2
Gibbsboro	906	D 4
Gibbstown	2,546	C 4
Gillette	1,300	E 2
Gladstone-Peapack	1,450	D 2
Glassboro	5,867	C 4
Glasser	100	D 2
Glen Gardner	654	D 2
Glen Ridge	7,620	B 2
Glen Rock	7,145	B 1
Glendola	700	E 3
Glenwood	425	D 1
Gloucester City	14,357	C 4
Gloucester Heights	1,200	B 3
Goshen	360	D 5
Grasselli		B 3
Great Meadows	825	D 2
Great Notch	1,000	B 2
Green Bank	200	D 4
Green Creek		D 5
Green Pond	105	E 1
Green Village	800	D 2
Greendell	100	D 2
Greenwich	950	C 5
Greenwich Pier	25	C 5
Grenloch		C 4
Greystone Pk.		D 2
Groveville	700	D 3
Guttenberg	5,566	C 2
Hackensack	29,219	F 2
Hackettstown	3,894	D 2
Haddon Hts.	7,287	C 4
Haddonfield	10,495	D 4
Hainesburg	437	C 2
Hainesport	1,130	D 4
Hainesville	100	D 1
Haledon	6,204	B 1
Haleyville	100	C 5
Hamburg	1,305	D 1
Hamilton	750	E 3
Hamilton Sq.	3,500	D 3
Hammonton	8,411	D 4
Hampton	975	D 2
Hancocks Bridge	300	C 4
Hanford		D 1
Hanover		E 2
Harbourton	82	D 3
Hardingville	75	C 4
Harlingen		D 3
Harrington Park	1,634	C 1
Harrison	13,490	B 2
Harrisonville	338	C 4
Hartford	500	D 4
Harvey Cedars	106	E 4
Hasbrouck Heights	9,181	B 2
Haskell	3,000	A 1
Haworth	1,612	C 1
Hawthorne	14,816	E 2
Hazlet	800	E 3
Heislerville	300	D 5
Helmetta	580	E 3
Hewitt		E 1
Hi-Nella	237	B 4
Hibernia	350	E 2
High Bridge	1,854	D 2
Highland Pk.	9,721	E 2
Highlands	2,959	F 3
Hightstown	3,712	D 3
Hillsdale	4,127	E 2
Hillside	†21,007	B 2
Hoboken	50,676	C 2
Hohokus	2,254	B 1
Holmdel	500	E 3
Holmeson		E 3
Hopatcong	1,173	D 2
Hope	500	D 2
Hopewell	1,869	D 3
Hornerstown	140	E 3
Hudson Hts.	2,000	C 2
Imlaystown		D 3
Interlaken	833	E 3
Iona	150	C 4
Ironia	300	D 2
Irvington	59,201	B 2
Iselin	7,000	E 2
Island Beach	13	*E 4
Island Heights	795	E 4
Jacobstown		D 3
Jamesburg	2,307	E 3
Jersey City	299,017	F 2
Jobstown	250	D 3
Johnsonburg	150	D 2
Juliustown	350	D 3
Jutland	120	D 2
Keansburg	5,559	E 3
Kearny	39,952	B 2
Keasbey	2,000	E 2
Kenilworth	4,922	E 2
Kenvil	1,361	D 2
Keswick Grove	150	E 4
Keyport	5,888	E 3
Kingston	900	D 3
Kinnelon	1,350	E 2
Kirkwood	550	B 4
Lafayette	1,100	D 1
Lake Como		E 3
Lake Hiawatha	8,000	E 2
Lake Hopatcong	5,000	D 2
Lakehurst	1,518	E 3
Lakewood	9,970	E 3
Lambertville	4,477	D 3
Lamington	150	D 2
Landing	1,500	D 2
Landisville	1,500	D 4
Lanoka Harbor	250	E 4
Laurel Sprs.	1,540	B 4
Laurelton	800	E 3
Laurence Harbor	5,000	E 3
Lavallette	567	E 4
Lawnside	1,566	B 3
Lawrenceville	1,056	D 3
Layton	350	D 1
Lebanon	752	D 2
Ledgewood	800	D 2
Leeds Point	400	E 4
Leesburg		D 5
Leonardo	1,887	E 3
Leonia	7,378	C 2
Liberty Cor.	1,500	D 2
Lincoln Pk.	3,376	A 1
Lincroft		E 3
Linden	30,644	E 2
Lindenwold	3,479	B 4
Linwood	1,925	D 5
Little Falls	6,600	E 2
Little Ferry	4,955	B 2
Little Silver	2,595	F 3
Little York		C 2
Livingston	10,100	E 2
Locust	500	F 3
Lodi	15,392	B 2
Long Branch	23,090	F 3
Long Valley		D 2
Longport	618	D 5
Lower Bank	118	E 4
Lower Squankum	150	E 3
Lumberton	600	D 4
Lyndhurst	†19,980	B 2
Lyons		D 2
Madison	10,417	E 2
Magnolia	1,883	C 4
Mahwah	3,800	E 1
Malaga	425	C 4

* No room on map for name. †Population of township.



PENNSYLVANIA
NEW YORK
SUSSEX
PASSAIC
MORRIS
ESSEX
WARREN
HUNTERDON
SOMERSET
UNION
MIDDLESEX
MERCER
MONMOUTH
Port Jervis
High Point 1,801 HIGHEST POINT
Peekskill
Ossining
Tarrytown
Yonker
Haverstraw
Harriman
Chester
Warwick
Tuxedo
Suffern
Newton
Sparta
Dover
Morristown
Paterson
Passaic
Clifton
Montclair
Bloomfield
E. Orange
Newark
Jersey City
New York
Elizabeth
Plainfield
Westfield
Summit
Perth Amboy
New Brunswick
Princeton
Trenton
Red Bank
Long Branch
Asbury Park
Freehold
Easton
Phillipsburg
Stroudsburg
Flemington
Somerville
Lambertville
Doylestown
Lansdale
Sandy Hook
Lower New York Bay
Staten Island
Long Island
Delaware River
Hudson River
SCALE OF MILES
PATERSON
Hackensack
Englewood
Union City
Hoboken
Bayonne
St. George
Irvington
PHILADELPHIA


NEW JERSEY
SCALE OF MILES
0 5 10 15 20
State Capitals
Canals
County Seats
Railroads
PHILADELPHIA
CAMDEN
Gloucester City
Chester
Wilmington
Trenton
Bristol
Burlington
Mount Holly
Lakewood
Toms River
Lakehurst
Lakehurst NAV AIR STA
MCGUIRE AIR FORCE BASE
Bridgeton
Millville
Vineland
Atlantic City
Pleasantville
Ventnor City
Ocean City
Cape May
Cape May Court House
Wildwood
North Wildwood
Dover
Salem
Woodbury
Camden
Collingsworth
Haddonfield
Audubon
Haddon Heights
Lawnside
Ashland
Somerdale
Hi-Nella
Stratford
Laurel Springs
Lindenwold
Gibbsboro
Kirkwood
Runnemede
Westville
Bellmawr
Mount Ephraim
Brooklawn
Barrington
Magnolia
Thorofare
Woodbury Hts
Almonesson
Glassboro
Pitman
Sewell
Mantua
Wenonah
Blackwood
Clementon
Berlin
Atco
Chesilhurst
Waterford Works
Winslow Jc.
Hammonton
Folsom
Elwood
Egg Harbor City
Port Republic
Cologne
Leeds Point
Absecon
Brigantine
Longport
Margate City
Somers Point
Linwood
Northfield
Pomona
Oceanville
Mays Landing
Millmay
Richland
Mizpah
Landisville
Buena
Minotola
Newfield
Malaga
Franklinville
Ilona
Hardingville
Clayton
Williamstown
Monroeville
Yorktown
Daretown
Elmer
Centerton
Deerfield Street
Norma
Rosenhayn
Seabrook
Shiloh
Canton
Roadstown
Greenwich
Fairton
Cedarville
Newport
Haleyville
Dividing Creek
Port Norris
Fortescue
Bivalve
Leesburg
Maurice River
Woodbine
Palermo
Mauricetown
Dorchester
Belleplain
Petersburg
Tuckahoe
Estell Manor
Corbin City
Port Elizabeth
Dorothy
Risley
Absecon Inlet
Great Egg Harbor Inlet
Little Egg Inlet
Brigantine Inlet
Beach Haven Inlet
Little Egg Harbor
Great Bay
Barnegat Inlet
Barnegat Light
Barnegat Bay
Long Beach Island
Beach Haven
Beach Haven Crest
Beach Haven Terrace
Ship Bottom
Surf City
Harvey Cedars
Manahawkin
Cedar Run
Mayetta
Staffordville
West Creek
Parkertown
Tuckerton
New Gretna
Lower Bank
Green Bank
Waretown
Lanoka Harbor
Forked River
Chatsworth
Whitesbog
Browns Mills
Pemberton
Vincentown
Medford
Medford Lakes
Evesham
Marlton
Moorestown
Maple Shade
Merchantville
Palmyra
Riverside
Delanco
Riverton
Cinnaminson
Delair
Hartford
Haines Port
Masonville
Jobstown
Juliustown
Rancocas
Bridgeboro
Beverly
Edgewater Park
Delaware River
Delaware Bay
Cohansey R.
Stow Creek
Alloway Creek
Salem Creek
Oldmans Creek
Raccoon Creek
Mantua Creek
Big Timber Creek
Pine Valley
Grenloch
Blackwood Terrace
Strafford
Gibbstown
Paulsboro
Woodbury
Westville
Runnemede
Magnolia
Mount Royal
Clarksboro
Mickleton
Swedesboro
Pedricktown
Penns Grove
Carneys Point
Deepwater
Pennsville
Harrisonville
Sharptown
Woodstown
Richwood
Muullica Hill
Bridgeport
Holly Oak
Delaware Ordnance Reserve Depot
Centerville
Kennett Square
Avondale
Oxford
Landenberg
Rising Sun
Providence
Newark
New Castle
Childs
North East
Elkton
Aikin
Havre de Grace
Chesapeake Bay
Kirkwood
Delaware City
Port Penn
Massey
Clayton
Smyrna
Leipsic
Chestertown
Dover
St. Jones R.
Lebanon
Bowers
Felton
Frederica
Murderkill R.
Harrington
Milford
Mispillion R.
Deepwater Point
Egg Island Point
Ben Davis Pt.
Delaware Bay
Cape May Point
West Cape May
North Cape May
Coldspring
Villas
Rio Grande
Green Creek
Whitesboro
Dias Creek
Stone Harbor
Hereford Inlet
Avalon
Townsends Inlet
Sea Isle City
Strathmere
Corson Inlet
Ocean View
Dennisville
Seaville
South Dennis
Goshen
Eldora
Heislerville
Delmont
Cape May Coast Guard Cent.
Cold Spring Harbor
Cold Spring Inlet
Wildwood Crest
Longitude 75° West of Greenwich
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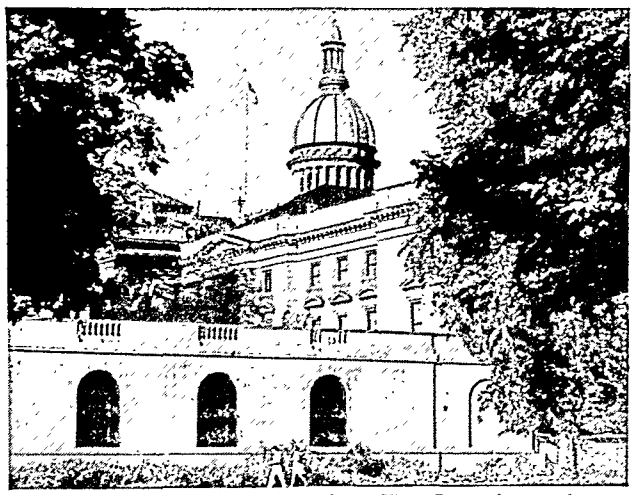
NEW JERSEY—*Continued*

Manahawkin 1,200 E 4
Manalapan E 3
Manasquan 3,178 E 3
Mantoloking 72 E 3
Mantua 3,000 C 4
Manville 8,597 D 2
Maple Shade 7,500 D 4
Maplewood †25,201 E 2
Marcella 300 E 2
Margate City 4,715 E 5
Marlboro 300 E 3
Marlton 475 D 4
Marmora 175 D 5
Martinsville 2,700 D 2
Masonville 1,500 D 4
Matawan 3,739 E 3
Maurice River D 5
Mauricetown 500 D 5
Mayetta 150 E 4
Mays Landing 1,301 D 5
Maywood 8,667 B 2
McAfee D 1
McKee City 200 D 5
Medford 1,300 D 4
Medford Lakes 461 D 4
Mendham 1,724 D 2
Menlo Park E 2
Mercerville 5,000 D 3
Merchantville 4,183 C 4
Metuchen 9,879 E 2
Mickleton 325 C 4
Middle Valley 300 D 2
Middlebush D 2
Middlesex 5,943 E 2
Middletown 700 E 3
Middleville 75 D 1
Midland Pk. 5,164 B 1
Midvale 2,000 E 1
Milford 1,012 C 2
Milhurst 25 E 3
Millburn †14,560 E 2
Millington 400 D 2
Millstone 289 D 2
Milltown 3,786 E 3
Millville 16,041 C 5
Milmay 294 D 5
Milton 1,100 D 1
Mine Hill 1,500 D 2
Minotola D 4
Mizpah 875 D 5
Monmouth Beach 806 F 3
Monmouth Junction 443 D 3
Monroe 150 D 1
Monroeville 500 C 4
Montague 600 D 1
Montclair 43,297 E 2
Montvale 1,856 E 1
Montville 2,000 E 2
Moonachie 1,775 B 2
Moorestown 9,175 D 4
Morganville E 3
Morris Plains 2,707 D 2
Morristown 17,124 D 2
Mt. Arlington 639 D 2
Mt. Ephraim 4,449 B 3
Mt. Freedom 500 D 2
Mt. Holly 8,206 D 4
Mount Hope 1,500 D 2
Mount Royal 850 C 4
Mountain Lakes 2,806 E 2
Mountain View 5,000 A 2
Mountainside 2,046 *E 2
Mullica Hill 900 C 4
Murray Hill 950 E 2
National Pk. 2,419 B 3
Naughright 300 D 2
Navesink 1,085 E 3
Neptune 3,073 E 3
Neshanic 500 D 3
Netcong 2,284 D 2
New Bedford 600 E 3
New Brunswick 38,811 E 3
New Egypt 1,294 E 3
New Gretna 600 E 4
New Hampton 200 D 2
New Lisbon D 4
New Market 1,500 D 2
New Milford 6,006 B 1
New Monmouth 700 E 3
New Providence 3,380 *E 2
New Sharon 50 D 3
New Vernon 1,100 D 2
Newark 438,776 E 2
Newfield 1,010 D 4
Newfoundland D 1
Newport 950 C 5
Newton 5,781 D 1
Newtonville D 4
Nixon 2,500 E 2
Norma C 4
Normandy Beach 150 E 3
N. Arlington 15,970 B 2
N. Bergen †41,560 B 2
N. Branch 600 D 2
N. Caldwell 1,781 B 2
N. Cape May C 6
N. Hackensack B 2
N. Haledon 3,550 B 1
N. Plainfield 12,766 *E 2
N. Wildwood 3,158 D 6
Northfield 3,498 D 5
Northvale 1,455 F 1
Norwood 1,792 C 1
Nutley 26,992 B 2
Oak Ridge 75 E 1
Oak Tree 2,000 E 2
Oakhurst 2,388 E 3
Oakland 1,817 E 1
Oaklyn 4,889 B 3
Ocean City 6,040 D 5
Ocean Gate 452 E 4
Ocean Grove 3,806 F 3
Ocean View 195 D 5
Oceanport 7,588 E 3
Oceanville 1,500 D 5
Ogdensburg 1,169 D 1
Old Bridge 3,500 E 3
Old Tappan 828 C 1
Oldwick 500 D 2
Oradell 3,665 B 1
Orange 38,037 B 2
Osbornsville 800 E 3
Oxford 1,041 C 2
Packanack Lake 3,000 B 1
Palermo 150 D 5
Palisade 3,784 C 2
Palisades Pk. 9,635 C 2
Palmyra 5,802 D 4
Paramus 6,268 B 1
Park Ridge 3,189 B 1
Parkertown E 4
Parlin 2,000 E 3
Parsippany E 2
Passaic 57,702 E 2
Paterson 139,336 E 2
Pattenburg 200 C 2
Paulsboro 7,842 C 4
Peapack-Gladstone 1,450 D 2
Pedricktown 575 C 4
Pemberton 1,194 D 4
Pennington 1,682 D 3
Penns Grove 6,669 C 4
Pennsauken †22,767 B 3
Pennsville 3,500 C 4
Pequannock 2,500 E 2
Perrineville E 3
Perth Amboy 41,330 E 2
Petersburg 250 D 5
Phalanx E 3
Phillipsburg 18,919 C 2
Pine Beach 495 E 4
Pine Brook 500 E 2
Pine Hill 2,546 *C 4
Pine Valley 39 D 4
Pitman 6,960 C 4
Pittstown 273 C 2
Plainfield 42,366 E 2
Plainsboro 1,118 D 3
Pleasant Gr. 75 D 2
Pleasantville 11,938 D 5
Pluckemin 300 D 2
Pt. Pleasant 4,009 E 3
Point Pleasant Beach 2,900 *E 3
Pomona 300 D 5
Pompton Lakes 4,654 A 1
Pompton Plains 3,450 E 2
Port Elizabeth 500 D 5
Port Monmouth 1,767 E 3
Port Morris 600 D 2
Port Murray 400 D 2
Port Norris 1,735 C 5
Port Reading 3,500 E 2
Port Republic 423 D 4
Pottersville 350 D 2
Princeton 12,230 D 3
Princeton Jct. D 3
Prospect Pk. 5,242 E 2
Prospect Plains 160 E 3
Quakertown 148 D 2
Quinton 1,000 C 4
Rahway 21,290 E 2
Ralston 500 D 2
Ramsey 4,670 E 1
Rancocas 500 D 3
Raritan 5,131 D 2
Readington 300 D 2
Reaville 219 D 3
Red Bank 12,743 E 3
Richland 800 D 5
Richwood 350 C 4
Ridgefield 8,312 B 2
Ridgefield Pk. 11,993 F 2
Ridgewood 17,481 E 2
Riegelsville 250 C 2
Ringoes 400 D 3
Ringwood 1,752 E 1
Rio Grande D 5
Risley D 5
River Edge 9,204 B 1
Riverdale 1,352 E 2
Riverside 7,199 D 3
Riverton 2,761 D 3
Roadstown 125 C 5
Robbinsville 2,038 D 3
Rochelle Pk. 4,475 B 2
Rockaway 3,812 D 2
Rockleigh 110 C 1
Rocky Hill 537 D 3
Roebling 3,325 D 3
Roosevelt 720 E 3
Roseland 2,019 A 2
Roselle 17,681 B 2
Roselle Pk. 11,537 A 2
Rosemont 117 D 3
Rosenhayn 1,000 C 5
Rumson 4,044 F 3
Runnemede 4,217 C 4
Rutherford 17,411 B 2
Saddle River 1,003 B 1
Salem 9,050 C 4
Sand Brook 175 D 3
Sayreville 10,338 E 3
Schooleys Mt. 250 D 2
Scobeyville 350 E 3
Scotch Plains 9,000 E 2
Sea Bright 999 F 3
Sea Girt 1,178 E 3
Sea Isle City 993 D 5
Seabrook 2,284 C 5
Seaside Heights 862 E 4
Seaside Park 987 E 4
Secaucus 9,750 B 2
Sergeantsville 175 D 3
Sewaren 1,800 E 2
Sewell 600 C 4
Sharptown 225 C 4
Shiloh 427 C 5
Ship Bottom 533 E 4
Short Hills 7,000 E 2
Shrewsbury 1,613 E 3
Sicklerville 3,500 D 4
Singac A 2
Skillman 3,500 D 3
Smithburg 25 E 3
Smiths Mills 40 E 1
Smithville 350 D 4
Somerdale 1,417 D 4
Somers Pt. 2,480 D 5
Somerville 11,571 D 2
S. Amboy 8,422 E 3
S. Belmar 1,294 *E 3
S. Bound Brook 2,905 E 2
S. Branch 120 D 2
S. Cape May D 6
S. Dennis 372 D 5
S. Orange 15,230 A 2
S. Plainfield 8,008 E 2
S. River 11,308 E 3
S. Seaville D 5
S. Toms River 492 E 4
S. Vineland D 5
Southard 750 E 3
Sparta 1,800 D 1
Sperry Sprs. 500 D 2
Spotswood 2,325 E 3
Spring Lake 2,008 F 3
Spring L. Hts. 1,798 *E 3
Springfield †7,214 E 2
Staffordville 250 E 4
Stanhope 1,351 D 2
Stanton 150 D 2
Stelton E 2
Stephensburg 200 D 2
Stewartsville 1,000 C 2
Stillwater 275 D 1
Stirling 1,076 E 2
Stockholm 500 D 1
Stockton 488 D 3
Stone Harbor 670 D 5
Stratford 1,356 C 4
Strathmere 110 D 5
Succasunna 1,022 D 2
Summit 17,929 E 2
Surf City 291 E 4
Sussex 1,541 D 1
Swartswood 150 D 1
Swedesboro 2,459 C 4
Tabor 2,500 E 2
Tavistock 15 *B 3
Teaneck †33,772 B 2
Tenafly 9,651 F 2
Tennent 250 E 3
Teterboro 28 B 2
Thorofare 500 B 4
Three Bridges 700 D 2
Titusville 2,500 D 3
Toms River 2,517 E 4
Totowa 6,045 B 1
Towaco 1,500 E 2
Townsends Inlet 175 D 5
Tranquility 100 D 2
Treasure Isl. C 3
TRENTON 128,009 D 3
Tuckahoe 800 D 5
Tuckerton 1,332 E 4
Union †38,004 E 2
Union Beach 3,636 E 3
Union City 55,537 C 2
Upper Macopin 500 E 1
Upper Saddle River 706 B 1
Vail 75 C 2
Van Hiseville 250 E 3
Vauxhall 7,000 A 2
Ventnor 8,185 E 5
Vernon 360 E 1
Verona 10,921 E 2
Vienna 275 D 2
Villas 700 D 5
Vincentown D 4
Vineland 8,155 C 5
Vulcanite 900 C 2
Waldwick 3,963 E 1
Wallington 8,910 B 2
Wallpack Ctr. 210 D 1
Wanamassa 2,512 E 3
Wanaque 4,222 B 1
Waretown 750 E 4
Warren Pt. 5,000 B 1
Warrenville 850 D 2
Washington 4,802 D 2
Watchung 1,818 E 2
Waterford Works 1,200 D 4
Wayne A 1
Weehawken †14,380 C 2
Wenonah 1,511 C 4
West Berlin D 4
W. Caldwell 4,666 A 2
W. Cape May 897 D 6
W. Creek 525 E 4
W. Englewood 14,000 C 2
W. Freehold 100 E 3
W. Long Br. 2,739 F 3
W. Milford E 1
W. New York 37,683 C 2
W. Norwood 1,900 C 1
W. Orange 28,605 A 2
W. Paterson 3,931 B 2
W. Pt. Pleasant 3,000 E 3
W. Portal D 2
W. Trenton D 3
W. Wildwood 237 D 6
Westfield 21,243 E 2
Weston 1,500 D 2
Westville 4,731 C 4
Westwood 6,766 B 1
Wharton 3,853 D 2
Whippany 2,100 E 2
White House Station 1,750 D 2
Whitehouse 600 D 2
Whitesbog 175 E 4
Whitesboro 700 D 5
Whitesville 450 E 3
Whiting 350 E 4
Wickatunk E 3
Wildwood 5,475 D 6
Wildwood Crest 1,772 D 6
Williamstown 2,632 D 4
Windsor 250 D 3
Winfield 2,720 B 3
Winslow D 4
Winslow Jct. D 4
Wood-Lynne 2,776 B 3
Wood-Ridge 6,283 B 2
Woodbine 2,417 D 5
Woodbridge †35,758 E 2
Woodbury 10,931 C 4
Woodbury Heights 1,373 B 4
Woodcliff L. 1,420 B 1
Woodport 2,000 D 2
Woodstown 2,345 C 4
Wortendyke 650 B 1
Wrightstown 1,199 D 3
Wyckoff 5,400 E 2
Yardville 1,600 D 3
Yorktown 125 C 4
Zarephath 250 D 2
Zion 100 D 3

No room on map for name. †Population of township.

Under this policy so many large companies incorporated there that the state was called "the home of the trusts." In 1913 New Jersey tightened its control over corporations with the "Seven Sisters" acts against monopoly, price fixing, and restraint of trade. Public service franchises were also limited to 20 years, unless extended to 40 years by popular vote.

THE STATE BUILDINGS AT TRENTON



A gilded dome and lantern rise from New Jersey's statehouse. The statehouse and its annex stand in a fine park.

History of New Jersey

The first European visitor to what is now New Jersey was Giovanni da Verrazano, an Italian navigator sailing under the French flag. In the spring of 1524 he sailed around Sandy Hook and anchored in New York Bay. He was followed in 1525 by the Portuguese sailor Estevan Gómez.

Henry Hudson, exploring for the Dutch, arrived in 1609. In the early 1600's the Dutch settled at Fort Nassau, near present Gloucester City, and at Hoboken on the Hudson River. About 1638 Swedish colonists built forts on the east bank of the Delaware. They were driven out by the Dutch in 1655.

Meanwhile, the Delaware, or Lenni-Lenape, Indians, whose name means "the original people," took every opportunity to attack the white trespassers. They fought to protect their land, called Scheyichbi, "land bordering the ocean." They lived in lodges built of saplings and covered with bark. The first Indian reservation in the country was set aside for these Indians in 1758, at the present site of Indian Mills.

England claimed the region about the mouth of the Hudson in 1664. It granted New Jersey to Lord Berkeley and Sir George Carteret. The area was named in honor of Carteret, who had been governor of the island of Jersey in the English Channel. Philip Carteret, the first English governor, is said to have named the town of Elizabeth for the wife of his cousin, Sir George. Elizabeth was the colonial capital from 1665 to 1686.

In 1676 the province was divided into East and West Jersey. By 1682 William Penn and several other Quakers had become the proprietors of both the Jerseys. From 1702 to 1738, however, New Jersey had the same governor as New York.

Princeton University was founded in 1746. In 1766 Queens College was established in New Brunswick. The college's name was changed in 1825 to Rutgers. It is now the state university.

Like Boston, New Jersey had a "tea party"—at Greenwich near Delaware Bay in 1774. Young men in Indian costume burned a whole shipload of tea from England. New Jersey was also the site of many historic events during the Revolution—the retreat of Washington, the capture of the British at Trenton, the battles at Princeton and at Monmouth (*see* Revolution, American). In the latter battle, according to a popular story, the heroic Molly Pitcher fired her wounded husband's cannon. Washington and his army spent several winters at Morristown. The British took Camden, along with Philadelphia, in 1776.

At the Constitutional Convention in Philadelphia in 1787, New Jersey represented the smaller states. The large states had proposed the Virginia plan, which called for a strong national government with a congress based on population. The New Jersey plan proposed equal representation of all the states. Both plans were finally adopted, the former for the House of Representatives, and the New Jersey plan for the Senate (*see* United States Constitution). On Dec. 18, 1787, New Jersey became the third state to ratify the Constitution.

New Jersey started the Morris Canal in 1824 and the Delaware and Raritan Canal in 1826. It completed its first railway—the Camden and Amboy—in 1834. John Fitch, a Trenton clockmaker, built one of the first steamboats in 1787. Alexander Hamilton dueled with Aaron Burr at Weehawken in 1804. Samuel F. B. Morse sent his first telegraph message near Morristown in 1838. The state's military heroes include William Bainbridge and James Lawrence (War of 1812), Philip Kearny (Civil War), and Robert F. Stockton (who aided in the conquest of California). In 1879 Thomas Edison lighted the first practical electric lamp at Menlo Park. In West Orange, he perfected other inventions. Woodrow Wilson was governor of New Jersey when elected president in 1912. Since 1933 the physicist Albert Einstein has lived at Princeton. (*See also* chronology in New Jersey Fact Summary; United States, section "Middle Atlantic Region.")

PRINCETON'S OLDEST BUILDING



Nassau Hall was the first building erected on the campus of Princeton University. It was completed in 1756 and for many years housed a dormitory, classrooms, and chapel. It is now an office building.

NEWMAN, JOHN HENRY, CARDINAL (1801–1890). When all else that Newman did and wrote has been for the most part forgotten, his name will still be kept alive by his well-known hymn:

Lead, Kindly Light, amid the encircling gloom,
Lead Thou me on!
The night is dark, and I am far from home;
Lead Thou me on!
Keep Thou my feet; I do not ask to see
The distant scene,—one step enough for me.

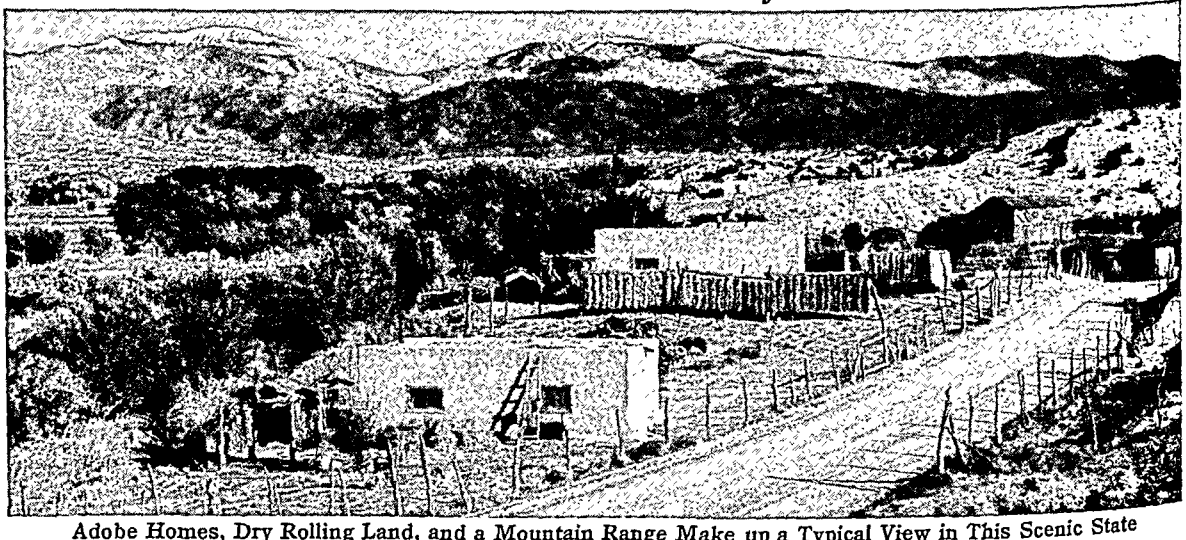
These beautiful lines have found their way into almost every heart and hymn-book. Newman composed them in 1833, while on shipboard returning to England from a voyage to the Mediterranean, before the religious questionings had arisen which led him from the Church of England to the Church of Rome. During his long life his work was largely a passionate expression in masterly prose of intellectual struggle and spiritual quest.

Two years after taking his degree at Trinity College, Oxford, he obtained a fellowship at Oriel, "the center of Oxford intellectualism." Always of a dreamy religious temperament, he became a clergyman of the Church of England as well as an Oxford tutor. He became a leading spirit in the famous "Oxford movement," a High Church reaction which manifested itself in a series of 'Tracts for the Times', of which he was the chief author. His romantic vision of the medieval church restored in its power and grandeur gradually led this simple sincere ascetic, with grave kind eyes and a thoughtful smile, into the Roman Catholic church, which he called "a home after many storms." He was ordained a priest at Rome in 1845, and was appointed a cardinal in 1879. He died at Birmingham on Aug. 11, 1890.

It was in his many sermons, lectures, and writings that Newman became one of the great religious forces of his day. The spiritual fervor, the searching subtle intellect, and the charm of his personality were supplemented by a fine prose style seldom surpassed.

'The Newman Treasury', edited by C. F. Harrold (Longmans, 1943), includes selections from Newman's essays and sermons and portions of 'Apologia pro Vita Sua' and 'Meditations'. Biographies include 'John Henry Newman' by John Moody (Sheed, 1945), and 'Red Hat' by Covelle Newcomb, for young people (Longmans, 1941).

NEW MEXICO—WONDERLAND *of* RUGGED BEAUTY



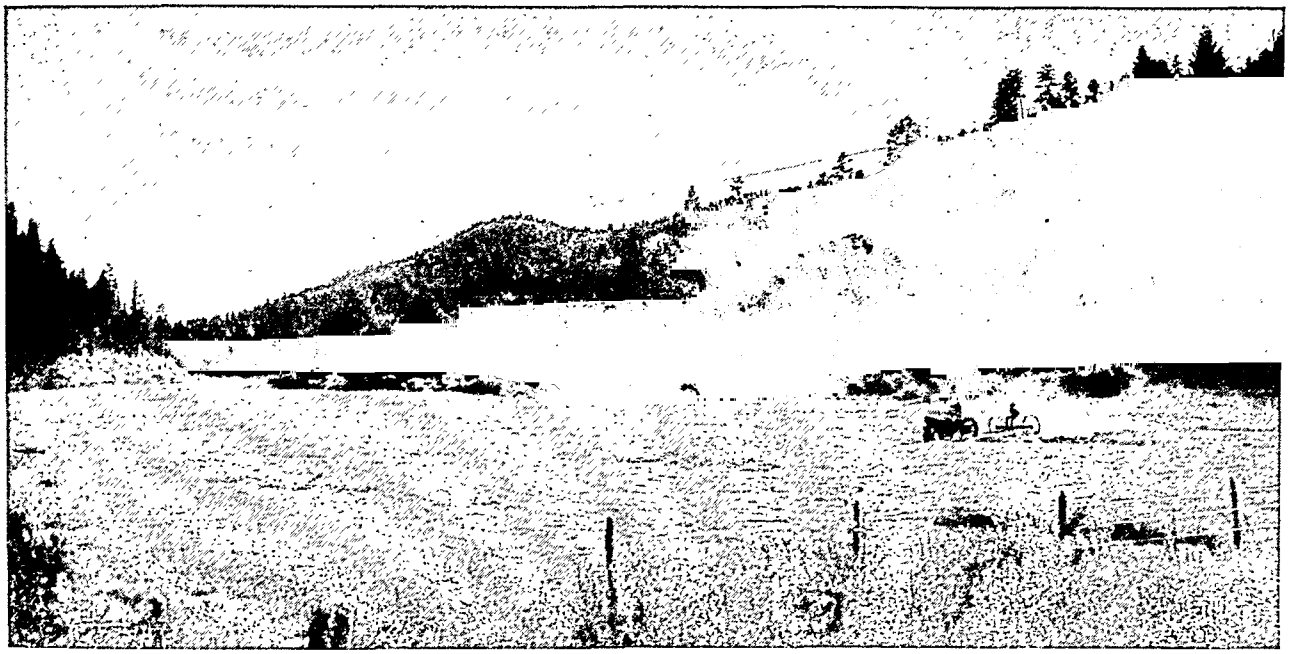
Adobe Homes, Dry Rolling Land, and a Mountain Range Make up a Typical View in This Scenic State

NEW MEXICO. The strange beauty and charm of the ancient land which its white inhabitants have named New Mexico have been summed up by the western novelist Zane Grey, who knew this country well. In describing its land and natives, he wrote:

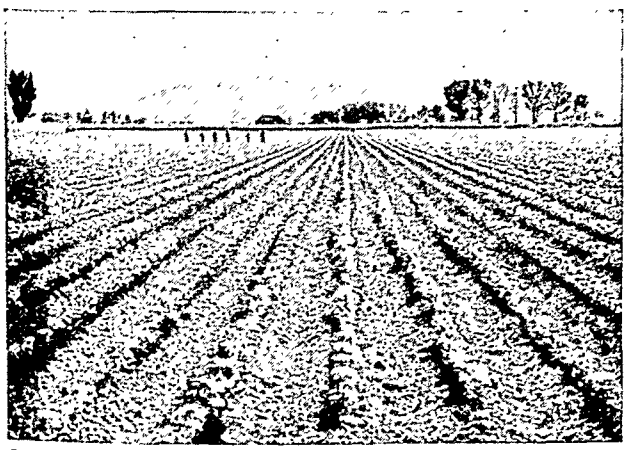
"Red rocks, the alkali flats like snow, the sand dunes so graceful and curved, the long cedar slopes, speckled green and gray, leading up to the bold peaks; the vast black belts of timber; the Navajo facing the sunrise with his silent prayer, the Hopi in his alfalfa fields, or the Apache along the historic Apache trail; the coyote sneaking through the arroyos; the lonely cliff dwellings with their monuments of a vanished race; the endless slopes of sage, green and gray, and purple on the heights; the smell of cedar smoke, like burning leaves in autumn; the smell of the desert, dry and clean and somehow new; the tangy odor of cedar and juniper when your nostrils seem glued as with pitch; the sweet fragrance of the pine forests, and the indescribable and exhilarating perfume of the purple sage." New Mexico is all this and more too.

The state is a vast tableland broken by many mountain ranges. Only in the Staked Plain region is it possible to get out of sight of the mountains. The Rocky Mountains enter the state at the north and extend southeast for about 120 miles, as far as Santa Fe, in an unbroken chain of lofty peaks. The characteristic feature is the mesas, vast flat-topped hills that rise straight up from the surrounding country. Signs of volcanic action, such as lava plateaus, are found. The highest point of New Mexico is Wheeler Peak (13,151 feet) in the north central part.

CROPS AND LIVESTOCK FROM ARID LAND



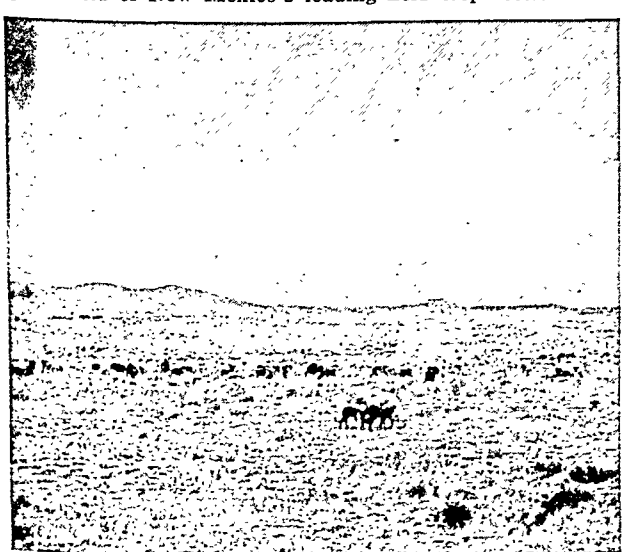
Stock raising is important in this arid or semiarid state. Here a modern tractor draws a hayrake to gather feed for some of the more than one million cattle in the state. The scene is near the Mescalero Apache Reservation in the south.



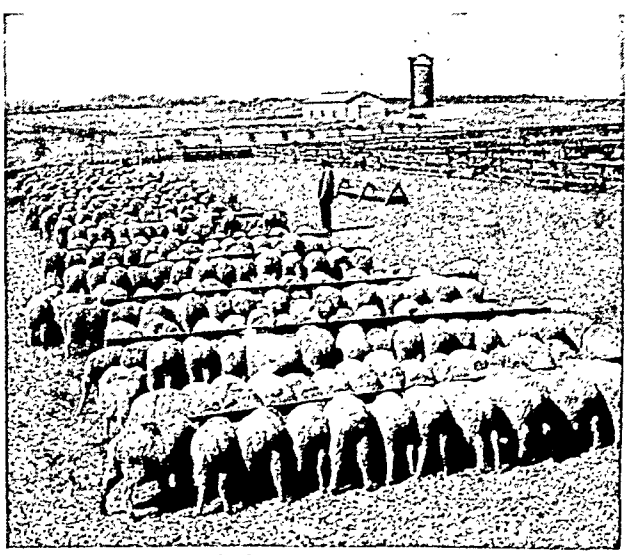
The Organ Mountains near Las Cruces look down on this irrigated field of New Mexico's leading field crop—cotton. The



picked cotton is pressed into 500-pound bales. This machine compresses the cotton so the metal bands can be fastened.

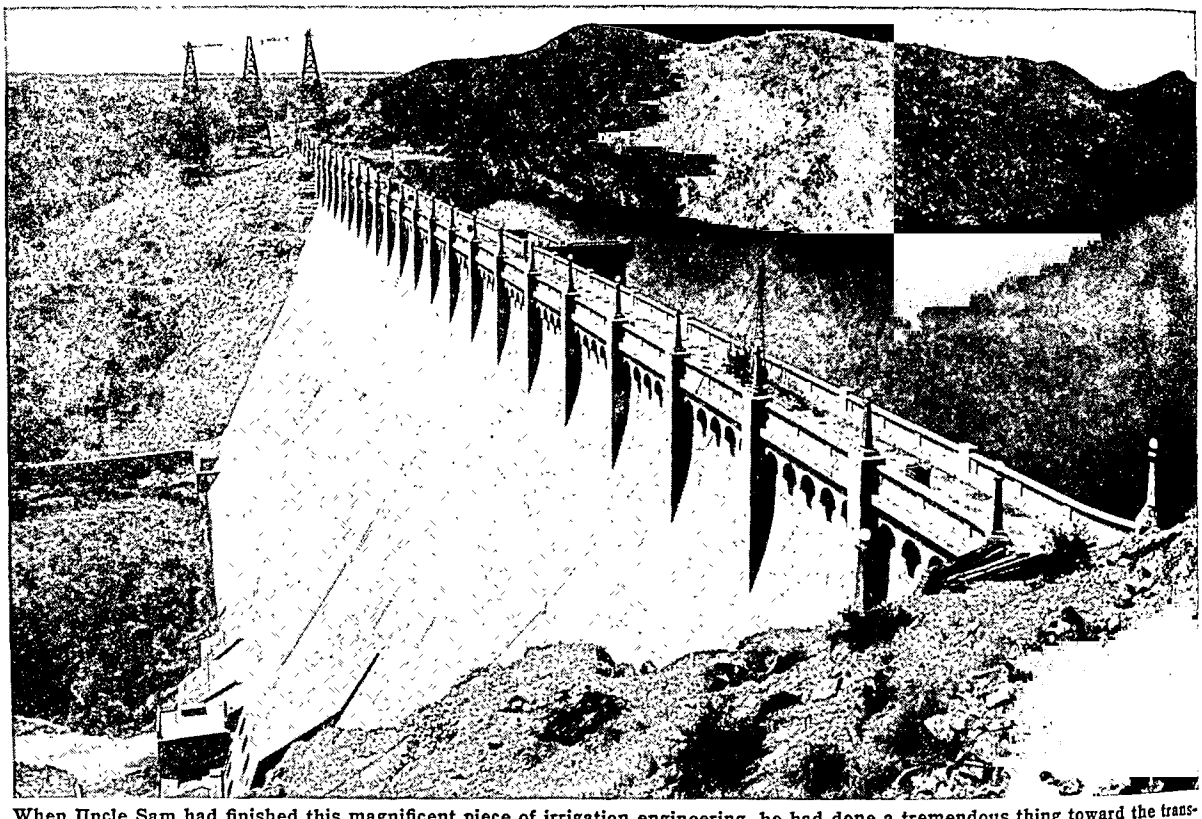


Here is feeding time—on the range and on a ranch. Some 1½ million sheep graze the wide ranges of New Mexico, making



it a major sheep-producing state. One sheep ranch has over a million acres and several others have more than 100,000 acres.

"ELEPHANT BUTTE" DAM IN THE RIO GRANDE VALLEY



When Uncle Sam had finished this magnificent piece of irrigation engineering, he had done a tremendous thing toward the transformation of the desert. This dam stores enough water to cover 2,219,000 acres a foot deep.

Among the most famous of the mesas are the superb Enchanted Mesa and its neighbor Acoma, about 55 miles southwest of Albuquerque. On the flat-topped summit of Acoma is an Indian pueblo, believed to be the oldest continuously inhabited village in the United States. It was ancient when members of Coronado's army visited it in 1540. Narrow foot trails lead to this lofty "sky city," 357 feet above the plain, but many of the Indians prefer to use the original precipitous trail which combines ladders with toe and finger holes. Every pound of mud used in building the three-story adobe houses was carried up from the plains on human backs. The Mission, established in 1629 by a Franciscan priest, Juan Ramirez, is a monument to patient endeavor. Its roof beams, 40 feet long and 14 inches square, were carried from the mountains 20 miles distant.

Acoma's inhabitants once descended to the plains only to cultivate their fields and tend their stock. Many of them now live in the plains villages the year around and return to Acoma only for ceremonies and festivals.

The immense arid tableland called the Staked Plain ("Llano Estacado") is in the southeastern corner of the state. In the south central part are the remarkable white gypsum sand dunes, 10 to 45 feet high, where dwell white reptiles and insects. The region is now a national monument. Capulin Mountain in the northeastern part of the state, the cinder cone of a recently extinct volcano, is also a national monument. One of the largest caves in the world, the Carlsbad Caverns, has been made a national park (*see* Caves; National Parks and Monuments).

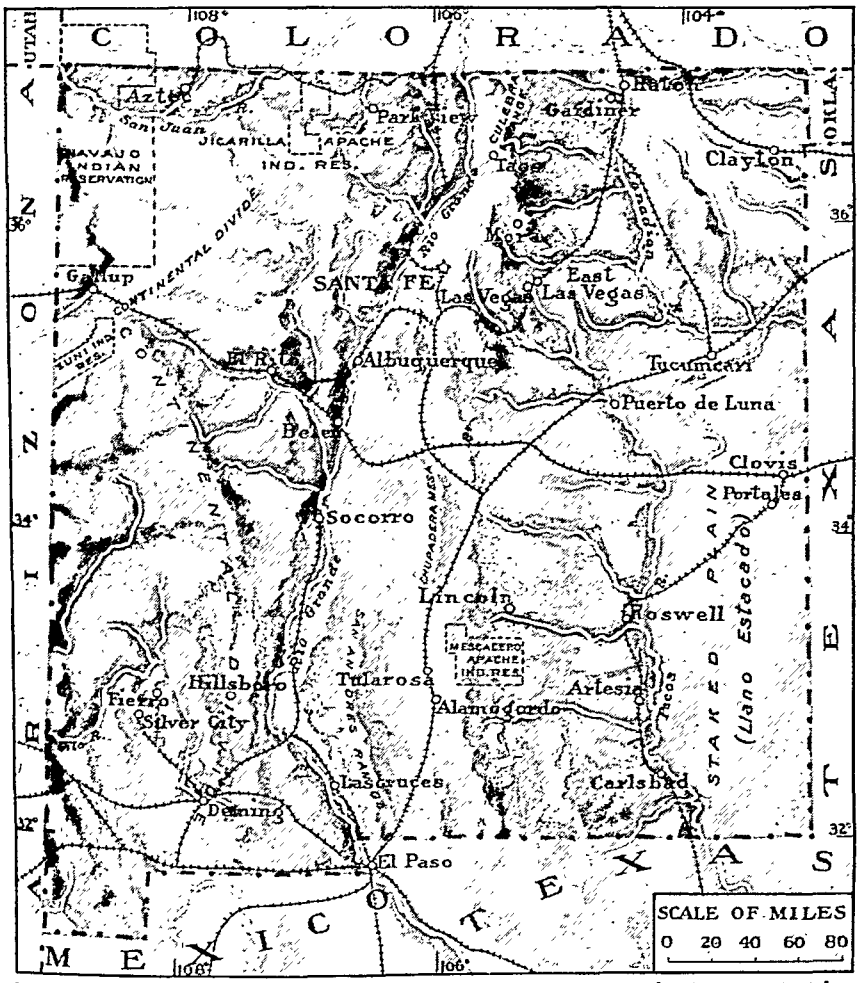
The valleys and flood plains of the New Mexican streams, when irrigated, furnish fine pasture. The salt marshes of the west center and the Rio Grande border supply the cattle ranges with salt. Sagebrush and greasewood dot the arid plateau of the northwest, more than 6,000 feet high.

Both the Rio Grande and the Pecos River are mountain streams at their sources. When the snows of the Rocky Mountains begin to melt, the Rio Grande floods the lowlands and covers them with a rich deposit of silt. In the dry season many small rivers vanish, leaving dry beds called *arroyos*.

The picturesque flowering yuccas abound everywhere. Pinyon and cedar trees are abundant in the foothills, and mesquite and the saguaro, a giant cactus, in the south. The native animals are not numerous, but include bears, deer, mountain lions, wildcats, antelopes, and coyotes. Rattlesnakes, the Gila monster, and the tarantula are common only in certain places and at certain times.

The climate, with its hot yet never oppressive summer days and always cool nights, is peculiarly healthful because of the low humidity, high altitude, and southern latitude. Plants dry up and dead bodies mummify rather than decay; wood is practically ever-

A LAND OF MOUNTAINS AND PLATEAUS



New Mexico's surface ranges from snow-covered northern mountains to great stretches of desert farther south. The state also has grazing land and irrigated river valleys.

lasting and meat can be cured in the open air without salt or other preservative.

The climate of New Mexico is semiarid. Its yearly precipitation averages between 14 and 15 inches. About one third of this total is received in July and August, the months of heaviest rainfall. Precipitation also varies in different parts of the state. As much as 24 inches fall in the southeast central section and as little as 8 inches in the northwest and southwest areas.

The temperature within the state averages about 54° F. during the year. In the summer it averages about 72°, and in the winter about 36°. In many places there is a wide range in the daily temperature. On a hot sunshiny summer day the thermometer may register 90°; at night it may fall to 50°.

Pasture Lands for Sheep and Cattle

New Mexico is mainly a grazing state. The first merino sheep came into the province with the Spanish colonists, and the descendants of these sheep now graze in New Mexico. Some of them are tended by Navajo Indian tribes. The days of the "sheep kings," who numbered their animals by the hundred thousand, are over. Today, in normal years, the state has about 1½ million sheep and lambs on its farms and ranges. In production of wool it is one of the leading states in the Union.

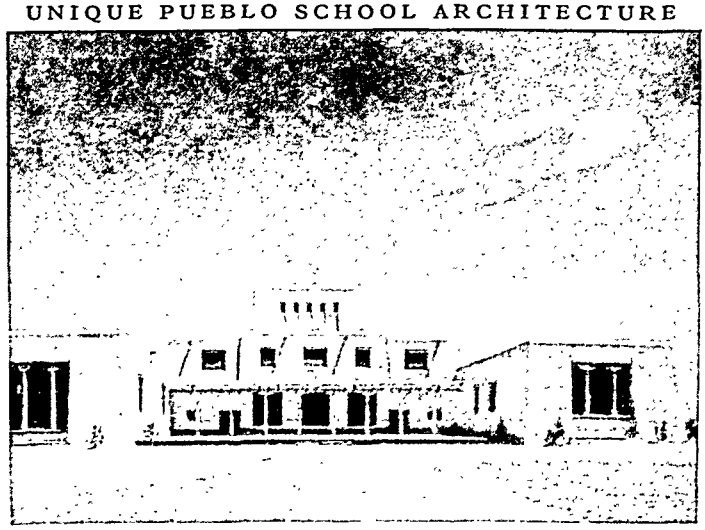
New Mexico normally has about 1¼ million beef and dairy cattle on its ranges. The sale of cattle is the chief single source of farm income. Although the dairy herds are a small part of the total number of the cattle, milk is a leading farm product. Cotton is the most valuable field crop. Hay and sorghum are used chiefly to feed the livestock.

Crops Obtained with Irrigation

Corn, wheat, and other grains, and fruits and vegetables are also grown largely with the aid of irrigation. For centuries before the white men came, native Pueblo Indians had practiced irrigation, but on a limited scale. At the present time, more than 650,000 acres have been made fit for agriculture by government and private irrigation projects.

Notable among the state's irrigation projects is that of the Rio Grande Valley. Main unit is huge Elephant Butte Dam. This dam is used for power, flood control, and to provide water to irrigate land in New Mexico, Texas, and Mexico. Twenty-two miles downstream is Caballo Dam. On the Canadian River in the northeast is Conchas Dam. Along the Pecos Valley, especially between Roswell and Carlsbad, the government has reclaimed some 25,000

UNIQUE PUEBLO SCHOOL ARCHITECTURE

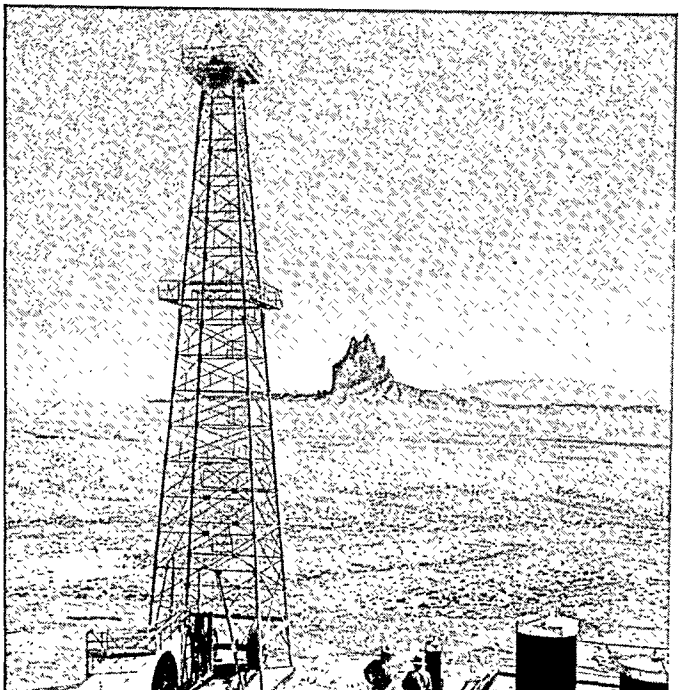


Buildings of the University of New Mexico, in Albuquerque, the state's leading institution of learning, are largely in the interesting Pueblo Indian style. The massive library shown here dominates the campus.

WEALTH FROM LIVESTOCK AND OIL



Farming and mining are about equal as the leading sources of income for the state. Cattle are the chief farm product. Above are the huge stockyards of Clovis, often called "the little Chicago of the West."



Petroleum is the most important mineral. The Rattlesnake oil field, near the town of Shiprock, has some of the nation's highest grade petroleum. Beyond it, Ship Rock Peak rises 1,400 feet as a landmark.

acres. On the Pecos are Alamogordo, McMillan, and Avalon dams. In the south, west of the Rio Grande, artesian wells are used in irrigation.

Mineral Wealth

Rivaling agriculture in value is mining. The chief minerals are petroleum, copper, and potassium salts, including potash. Most of the nation's potash comes from near Carlsbad in the southeast. Silver City, in the southwest, is in a copper-, lead-, silver-, and gold-mining region. The state also produces natural gas and its liquids, clays, fluorspar, pumice, pumicite, sand and gravel, stone, manganese ore, and coal. It mines turquoise and other gem stones. Uranium occurs in the northwest.

New Mexico does not do much manufacturing. Its largest industry is the manufacture of chemical products such as explosives, cottonseed oil, and carbon black. A small amount of lumbering is done throughout the state, particularly around Albuquerque.

Cities—Yesterday and Today

Santa Fe, the capital, was founded in 1609 by the Spanish on the site of an Indian village. The first permanent white settlement in the Southwest, it is one of the oldest in the United States (*see* Santa Fe).

As a territorial and state capital for about 350 years, it has been under the flags of Spain, Mexico, the Confederacy, and the United States. Santa Fe lies in a small valley west of the Sangre de Cristo Mountains. It was the end of the Santa Fe Trail, 850 miles from Independence, Mo. William Becknell led the first pack train over the trail in 1822. Then prairie schooners brought emigrants and traders. The old trail became a stagecoach line in 1849. The Atchison, Topeka, and Santa Fe Railroad partly paralleled it in 1880.

Santa Fe, a noted historic and tourist city, blends Indian, Spanish, and American cultures in its old and new buildings. Of interest are the government buildings and the five units of the Museum of New Mexico—the Palace of the Governors, Art Gallery, Laboratory of Anthropology, Hall of Ethnology, and the Museum of International Folk Art. Also in the city are the School of American Research, a government Indian school, and other schools.

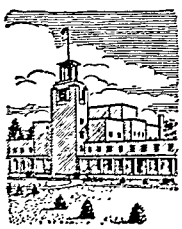
Southwest of Santa Fe on the upper Rio Grande is Albuquerque, the largest city. It was founded by the Spaniards in 1706. It is a health and tourist resort and a railroad and trading center. Here is the University of New Mexico, with its notable Museum of Anthropology; a government school and hospital for Indians; and the Church of San Felipe de Neri (*see* Albuquerque). On the lower Rio Grande is Las Cruces in an irrigated farm area, with a state agricultural college nearby. Las Vegas, east of Santa Fe, is virtually two towns,

Continued on page 181

New Mexico Fact Summary

NEW MEXICO (N. M.): Named after Old Mexico, in honor of Spanish explorers. From Indian name *Mexitli*, an Aztec god, plus *co* ("place of").
Nickname: "The Land of Enchantment," for its climate and scenery. Also "Sunshine State"; "Cactus State."
Seal: Small Mexican eagle grasps serpent in beak, holds cactus in claws; shielded by large American eagle.
Motto: *Crescit Eundo* (It Grows as It Goes).
Flag: For description and illustration, *see* Flags.
Flower: Yucca flower. **Bird:** Road runner. **Tree:** Piñon.
Song: 'O, Fair New Mexico'; words and music by Elizabeth Garrett.

THE GOVERNMENT



Capital: Santa Fe (since 1850, when it became territorial capital).
Representation in Congress: Senate, 2; House of Representatives, 2. Electoral votes, 4.
State Legislature: Senators, 31; term, 4 years. Representatives, 55; term, 2 years. Convenes second Tuesday in January in the odd-numbered years. Length of session limited to 60 days; recesses allowed.
Constitution: Adopted 1912. Proposed amendment must be (a) passed by a majority vote of both legislative houses and (b) ratified by a majority voting on amendment at a popular election.
Governor: Term, 2 years. May succeed himself once, then must wait 4 years before running for office again.
Other Executive Officers: Lieutenant governor, secretary of state, attorney general, treasurer, auditor, land commissioner, all elected; terms, 2 years; can serve only 2 consecutive terms. Three corporation commissioners, 1 elected every 2 years for 6-year term.
Judiciary: Supreme court—5 justices, elected by popular vote; term, 8 years. District courts—9; judges elected; term, 6 years. Probate courts—32; judges elected; term, 2 years.
County: 32 counties, each governed by 3 county commissioners; term, 2 years.
Municipal: Mayor and council plan most common.
Voting Qualifications: Age, 21; residence in state, one year; in county, 90 days; in precinct, 30 days.

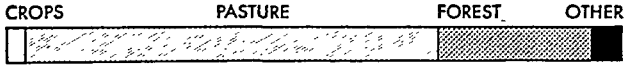


TRANSPORTATION AND COMMUNICATION

Transportation: Railroads, 2,500 miles. First railroad, Atchison, Topeka, and Santa Fe (Colorado boundary to Raton), 1878. Rural roads, 61,700 miles. Airports, 94.
Communication: Periodicals, 21. Newspapers, 66. First newspaper (in Spanish), *El Crepúsculo de la Libertad* (The Dawn of Liberty), Santa Fe, 1834; in English, *Santa Fe Republican*, Santa Fe, 1847. Radio stations (AM), 23; first station, KOB, Albuquerque, licensed May 1922. Television stations, 1; KOB-TV, Albuquerque, began operation Nov. 29, 1948. Telephones, 158,900. Post offices, 456.

THE PEOPLE AND THEIR LAND

Population (1950 census): 681,187 (rank among 48 states —39th); urban, 50.2%; rural, 49.8%. Density: 5.6 persons per square mile (rank—45th state).
Extent: Area, 121,666 square miles, including 155 square miles of water surface (4th state in size).
Elevation: Highest, Wheeler Peak, 13,151 ft., near Red R.; lowest, Red Bluff Reservoir, near Malaga, 2,817 ft.
Temperature (°F.): Average—annual, 54°; winter, 36°; spring, 52°; summer, 72°; fall, 54°. Lowest recorded, —50° (Gavilan, Rio Arriba County, Feb. 1, 1951); highest recorded, 116° (Orogrande, July 14, 1934, and other locations and earlier dates).
Precipitation: Average (inches)—annual, 14; winter, 2; spring, 3; summer, 6; fall, 3. Varies from about 8 along northwest and southwest to about 24 along southeast central.
Natural Features: Vast country of startling beauty within heart of great Southwest; Continental Divide runs from north to south through western part of state; Great Plains (east); Rocky Mountains (north central); Basin and Range Region (south central and southwest); Colorado Plateau (northwest). Principal rivers: Canadian, Gila, Pecos, Rio Grande, and San Juan.
Land Use: Cropland, 3%; nonforested pasture, 67%; forest, 25%; other (roads, parks, game refuges, wasteland, cities, etc.), 5%.



Natural Resources: *Agricultural*—plains, grazing lands, moist soil in central lowlands. *Industrial*—valuable deposits of petroleum, potassium salts, copper, natural-gas liquids, zinc. *Commercial*—mild dry climate, high elevation for health resort; many tourist attractions.

OCCUPATIONS AND PRODUCTS

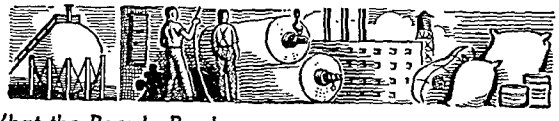
What the People Do to Earn a Living



Major Industries and Occupations, 1950

Fields of Employment	Number Employed	Percentage of Total Employed
Wholesale and retail trade	39,145	18.9
Agriculture, forestry, and fishery	38,377	18.6
Construction	23,380	11.3
Professional services (medical, legal, educational, etc.)	21,220	10.3
Transportation, communication, and other public utilities	16,983	8.2
Personal services (hotel, domestic, laundering, etc.)	13,610	6.6
Government	13,585	6.6
Manufacturing	12,146	5.9
Mining	10,522	5.1
Business and repair services	5,871	2.8
Finance, insurance, and real estate	4,550	2.2
Amusement, recreation, and related services	1,966	1.0
Workers not accounted for	5,189	2.5
Total employed	206,544	100.0

New Mexico Fact Summary



What the People Produce

A. Manufactured Goods (Rank among states—44th)
Value added by manufacture* (1952), $128,211,000

Leading Industries in 1947 (with Principal Products)	Value Added by Manufacture	Rank among States
CHEMICALS AND ALLIED PRODUCTS. Cottonseed-oil mills; explosives	$13,738,000	32
LUMBER AND PRODUCTS..... Sawmills and planing mills	8,250,000	36
FOOD AND KINDRED PRODUCTS.....	7,898,000	46
PRIMARY METAL INDUSTRIES..... Copper smelting and refining	.....†	.....

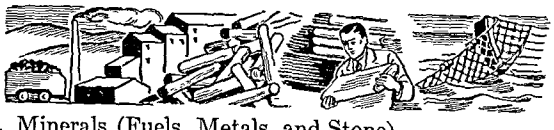
*For explanation of value added by manufacture, *see* Census.
†Figure withheld by Bureau of the Census.



B. Farm Products (Rank among states—38th)
Total cash income (1952), $212,269,000

Products	Amount Produced (10-Year Average)	Rank within State*	Rank among States†
Cattle.....	278,651,000 lbs.	1	22
Cotton lint.....	151,000 bales	2	14
Milk.....	124,000,000 qts.	3	44
Hay.....	477,000 tons	4	40
Sheep and lambs...	54,015,000 lbs.	5	14
Wheat.....	4,176,000 bu.	6	29
Sorghums, grain....	3,509,000 bu.	7	5
Sorghums, forage...	216,000 tons		8

*Rank in dollar value †Rank in units produced



C. Minerals (Fuels, Metals, and Stone)
Annual value (1951), $256,304,000
Rank among states—14th

Minerals (1951)	Amount Produced	Value
Petroleum.....	52,719,000 bbls.	$129,160,000
Potassium salts (potash)..	1,218,000 tons	37,210,000
Copper.....	74,000 tons	35,602,000
Zinc.....	45,000 tons	16,533,000
Natural-gas liquids.....	5,588,000 bbls.	13,677,000

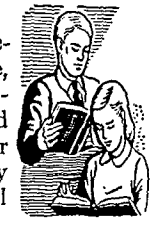
D. Trade

Trade (1948)	Sales	Rank among States
Wholesale.....	$259,969,000	44
Retail.....	477,553,000	43
Service.....	44,994,000	42

LARGEST CITIES (1950 census)

Albuquerque (96,815): business and railroad center; health resort; University of New Mexico; meat packing.
Santa Fe (27,998): oldest state capital city in U.S.; tourist trade; arts and crafts; hand-woven textiles.
Roswell (25,738): oil, cotton processing; meat packing.
Carlsbad (17,975): Carlsbad Caverns Natl. Park nearby; potash mines; oil fields; cottonseed processing.
Clovis (17,318): livestock center; railway shops.
Hobbs (13,875): petroleum and associated industries.

EDUCATION



Public Schools: Elementary, 640; secondary, 151. Compulsory school age, 6 through 16. State Board of Education composed of the governor and state supt. of schools, elected, 2-year term, and 5 members appointed by governor, 4-year terms. County school boards consist of county supt., elected, 2-year term, and 4 members, appointed by board consisting of state supt. of schools, district judge, and chairman of county board of commissioners. City school boards elected; appoint city supts.

Private and Parochial Schools: 97.

Colleges and Universities (accredited): Colleges, 9. State-supported schools include Univ. of New Mexico, Albuquerque; Eastern New Mexico Univ., Portales; New Mexico Col. of Agriculture and Mechanic Arts, State College; New Mexico Military Inst., Roswell; New Mexico Inst. of Mining and Technology, Socorro; 2 teachers colleges—New Mexico Western Col., Silver City; New Mexico Highlands Univ., Las Vegas.

Special State Institutions: N.M. School for Blind, Alamogordo; Home and Training School for Mental Defectives, Los Lunas; N.M. School for the Deaf, Santa Fe.

Libraries: City and town public libraries, 38; independent county library systems, 2; 2 counties contract for service with city libraries. State Library Commission responsible for developing library service. Noted special library: Library of Museum of N. M., Santa Fe.

Outstanding Museums: Museum of Anthropology Univ. of New Mexico, Albuquerque; Museum of New Mexico includes 5 units at Santa Fe—Palace of the Governors, Hall of Ethnology, Art Gallery, Laboratory of Anthropology, and Museum of International Folk Art.

CORRECTIONAL AND PENAL INSTITUTIONS

Girls' Welfare Home, Albuquerque; New Mexico Industrial School, Springer; State Penitentiary, Santa Fe.

PLACES OF INTEREST*

Alamogordo Dam—northwest of Fort Sumner; largest dam of Pecos R. reclamation project; northwest of (15).
Avalon Dam—north of Carlsbad; forms reservoir on Pecos River; south of symbol (19).
Aztec Ruins National Monument—north of Aztec; huge E-shaped pueblo apartment dwelling of 500 rooms (1).
Bandelier National Monument—ruins of ancient Indian pueblos and cliff dwellings northwest of Santa Fe (7).
Caballo Dam—on Rio Grande near Arrey; south of (20).
Capulin Mountain National Monument—steep cinder cone of extinct volcano; northeast of Capulin (2).
Chaco Canyon National Monument—northeast of Thoreau; Pueblo Indian ruins; Pueblo Bonito built 919 (6).
Elephant Butte Dam—east of Truth or Consequences; chief dam of reclamation project on Rio Grande (20).
El Morro National Monument—tablelike rock resembling fortress, used as refuge by Spanish conquerors, 1605-1774; Spanish inscriptions on walls; near El Morro (13).
Gila Cliff Dwellings Natl. Mon.—prehistoric cave dwellings; reached by trail; between Silver City and (18).
Gran Quivira National Monument—ruins of 17th-century Spanish mission; Indian Pueblo house mounds; southeast of Mountainair; east of symbol (16).
Grave of Billy the Kid—notorious outlaw killed in 1881; buried in cemetery near old Fort Sumner (15).

*Numbers in parentheses are keyed to map.

New Mexico Fact Summary

Hot Springs—hot, medicinal waters in Truth or Consequences (formerly Hot Springs) (20).

Navajo Indian Reservation—largest in U. S. (10 million acres); extends into Arizona, Colorado, and Utah (5).

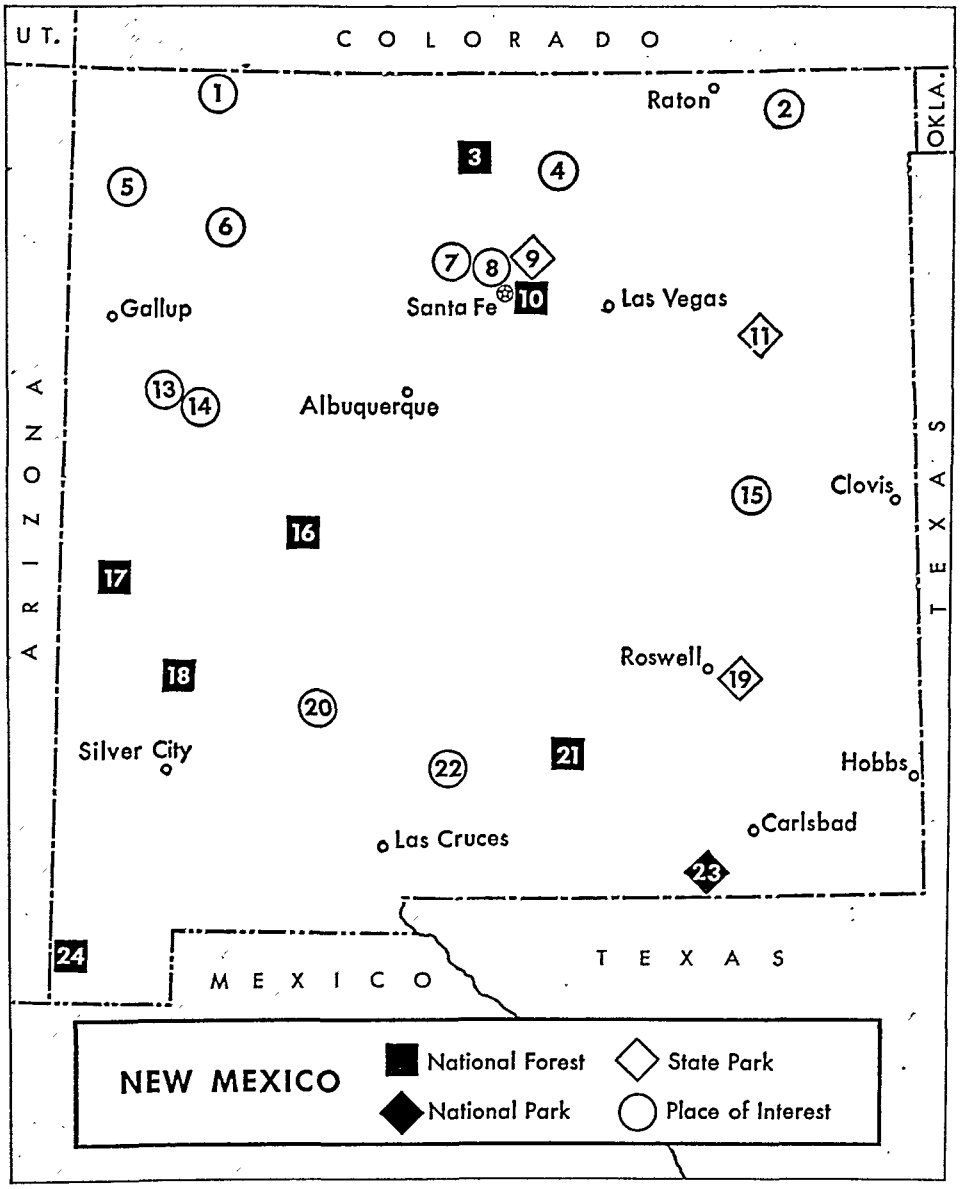
Perpetual Ice Caves—southwest of Grants; crevices of volcanic sinkhole packed with blue-colored ice (14).

Santa Fe—first permanent Spanish settlement of southwest; Palace of Governors, adobe fortress built in 1610; museums; San Miguel, one of oldest missions in U.S.; State Capitol (*see* Santa Fe) (8).

Taos—famous artists' colony; old mission at Ranchos de Taos, four miles south (4).

Taos Pueblo—Indian community north of Taos where ancient Indian ceremonies and ways of life are still carried on (4).

White Sands National Monument—southwest of Alamogordo; gleaming white crystal sands piled into large dunes (22).



NATIONAL FORESTS*

Apache—1,009,553 acres in state; 707,991 acres in Arizona; hdqrs., Springerville, Ariz. (17).

Carson—1,226,094 acres; hdqrs., Taos (3).

Cibola—2,275,282 acres; hdqrs., Albuquerque (16).

Coronado—128,323 acres in state; 1,371,265 acres in Arizona; hdqrs., Tucson, Ariz. (24).

Gila—2,458,505 acres; hdqrs., Silver City (18).

Lincoln—1,444,316 acres; hdqrs., Alamogordo (21).

Santa Fe—1,369,938 acres; hdqrs., Santa Fe (10).

NATIONAL PARK*

Carlsbad Caverns—45,847 acres; largest underground caverns yet discovered; many stalactites hang from ceilings; tinted stalagmites rise from floors; marble-lined pools (23).

STATE PARKS*

Blue Water—southwest of Grants; dam and lake; water sports; recreation area; north of symbol (14).

Bottomless Lakes—10 miles southeast of Roswell; scenic chain of lakes—deepest, 190 feet (19).

City of Rocks—southeast of Silver City; natural park with rock formations; southwest of symbol (20).

Conchas Dam—31 miles northwest of Tucumcari; water sports on lake formed by impounded waters (11).

Hyde—Indian pueblos; in 2 parts; one in Santa Fe along Santa Fe River; the other, 8 miles northeast (9).

Kit Carson Memorial—home and grave of famous frontier scout at Taos; near symbol (4).

THE PEOPLE BUILD THEIR STATE



1536—Cabeza de Vaca wanders into New Mexico from Texas.

1539—Franciscan friar, Marcos de Niza, explores New Mexico.

1540—Coronado begins his exploration and conquest of New Mexico.

1590—First attempt (unauthorized) by the Spaniard Gaspar de Sosa to colonize New Mexico.

1598—Juan de Oñate claims New Mexico for Spain; founds first Spanish settlement and church in state.

1609—Pedro de Peralta, governor of New Mexico, founds Santa Fe, first permanent Spanish settlement in the Southwest; moves capital there.

1680—Pueblo Indians revolt; all Spanish settlers killed or driven from New Mexico.

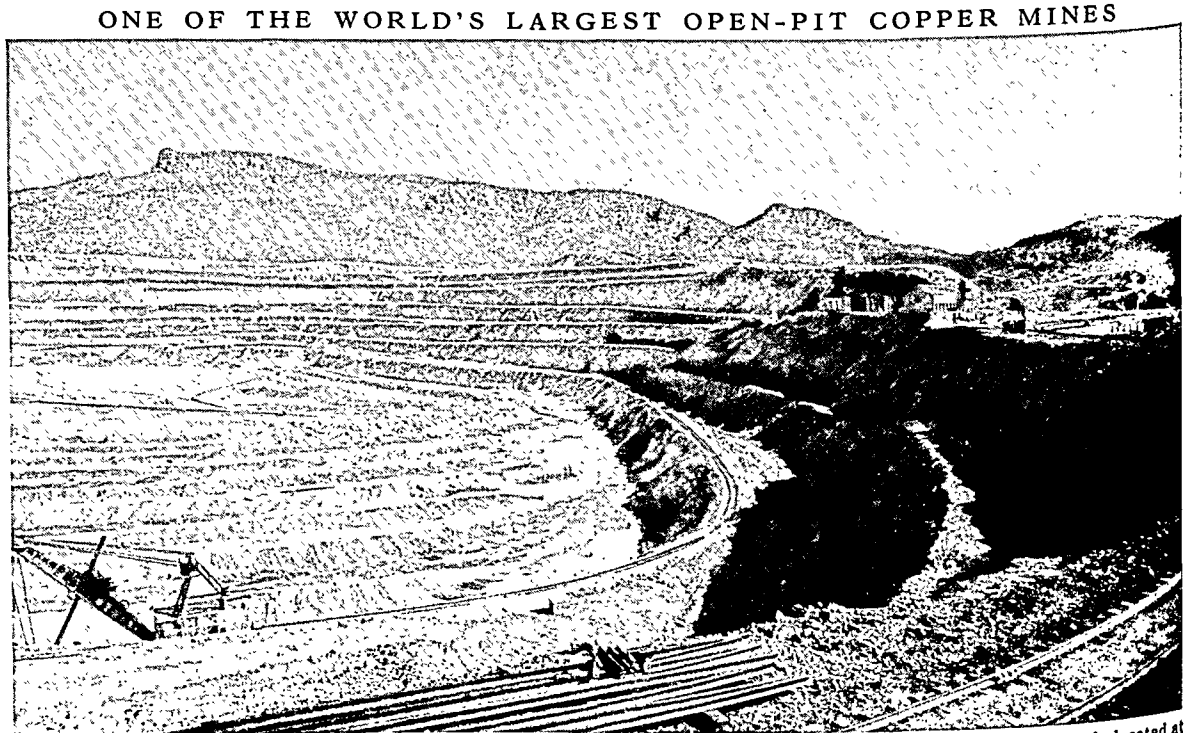
1692-96—Gov. Diego de Vargas reconquers New Mexico.

*Numbers in parentheses are keyed to map.

New Mexico Fact Summary

1706—Francisco Cuervo y Valdés founds Albuquerque.
1721—First public schools established by royal decree.
1739—Paul and Pierre Mallet, French fur traders, reach Santa Fe.
1776—Friars Escalante and Domínguez open first leg of Old Spanish Trail from Santa Fe to Los Angeles.
1787—Pedro Vial opens road San Antonio to Santa Fe.
1792—Vial breaks trail between Santa Fe and St. Louis, making first complete journey over Santa Fe Trail.
1800—Santa Rita copper deposit found near Silver City
1803—Louisiana Purchase extends U. S. to New Mexico.
1807—Lieut. Zebulon M. Pike enters region; arrested by Spanish; returned to Louisiana.
1821—Mexico wins its independence; makes New Mexico a Mexican province.
1822—William Becknell brings first wagon load of goods over Santa Fe Trail from St. Louis to Santa Fe.
1824—New Mexico becomes a Mexican territory, July 6.
1828—Mexico ratifies treaty to fix U. S.-Mexican border.
1833—First gold lode west of Mississippi R. discovered at Sierra del Oro (now the Ortiz mine).
1846—U. S. declares war on Mexico; wins battle at Brazito. Gen. Stephen Watts Kearny occupies Santa Fe; builds Fort Marcy, first U. S. fort in New Mexico. Charles Bent named first civil governor. Col. Alexander Doniphan defeats Navajos.
1848—By Treaty of Guadalupe-Hidalgo, Mexico cedes New Mexico and Upper California to U. S.
1849—Stage line, Santa Fe-Independence, Mo., begins.
1850—Territory of New Mexico created; capital, Santa Fe; James C. Calhoun first governor, 1851.
1851—First English-language school founded at Santa Fe.
1853—Gadsden Purchase adds Gila River area to Territory of New Mexico.
1857—Butterfield Stage Route establishes overland mail service from New Mexico to Pacific coast.
1861—New Colorado Territory cuts size of New Mexico.
1862—Confederates occupy Santa Fe; Union victory in Apache Canyon ends Confederate control in state.
1863—Territory of Arizona created; reduces New Mexico to its present boundaries.
1864—Col. Kit Carson defeats Navajo Indians.
1876—Cattlemen and rival political factions battle in "Lincoln County War."
1881—Billy the Kid, notorious "badman," killed.
1886—Geronimo, Indian chief, surrenders to Gen. Nelson A. Miles, thus ending Apache raids.
1888—Discovery of artesian water begins irrigation and farming of Pecos Valley.
1889—University of New Mexico created; opens 1892.
1892—Territorial capitol at Santa Fe burns, rebuilt, 1900.
1909—First oil in state discovered near Dayton.
1912—New Mexico becomes 47th state, Jan. 6; capital, Santa Fe; first governor, William C. McDonald.
1916—Raid on Columbus by Pancho Villa, Mexican bandit, leads to U. S. punitive expedition under Gen. John J. Pershing; raids end, 1917; Elephant Butte Dam on Rio Grande completed.
1922—Large oil fields discovered in San Juan County.
1930—Carlsbad Caverns National Park created.
1933—U. S. and Mexico agree to plan for controlling flood waters of Rio Grande.
1940—Coronado quartocentennial (400th) is celebrated. Conchas Dam on Canadian River completed.
1945—First atomic bomb is tested at White Sands.
1949—Los Alamos, atomic research center, becomes 32d county of state, June 30.
1950—Hot Springs renamed Truth or Consequences.
1951—Public school teachers in religious garb barred.
1953—Federal government aids in severe drought. Museum of International Folk Art opens at Santa Fe.
1954—Dust storm damage is extensive.

ONE OF THE WORLD'S LARGEST OPEN-PIT COPPER MINES



In open-pit mining, miners can work in fresh air and sunshine as they remove the copper ore with power shovels. This view shows a portion of the Chino open-pit mine, which is located at Santa Rita, N.M. This mine is the largest producer in the state.

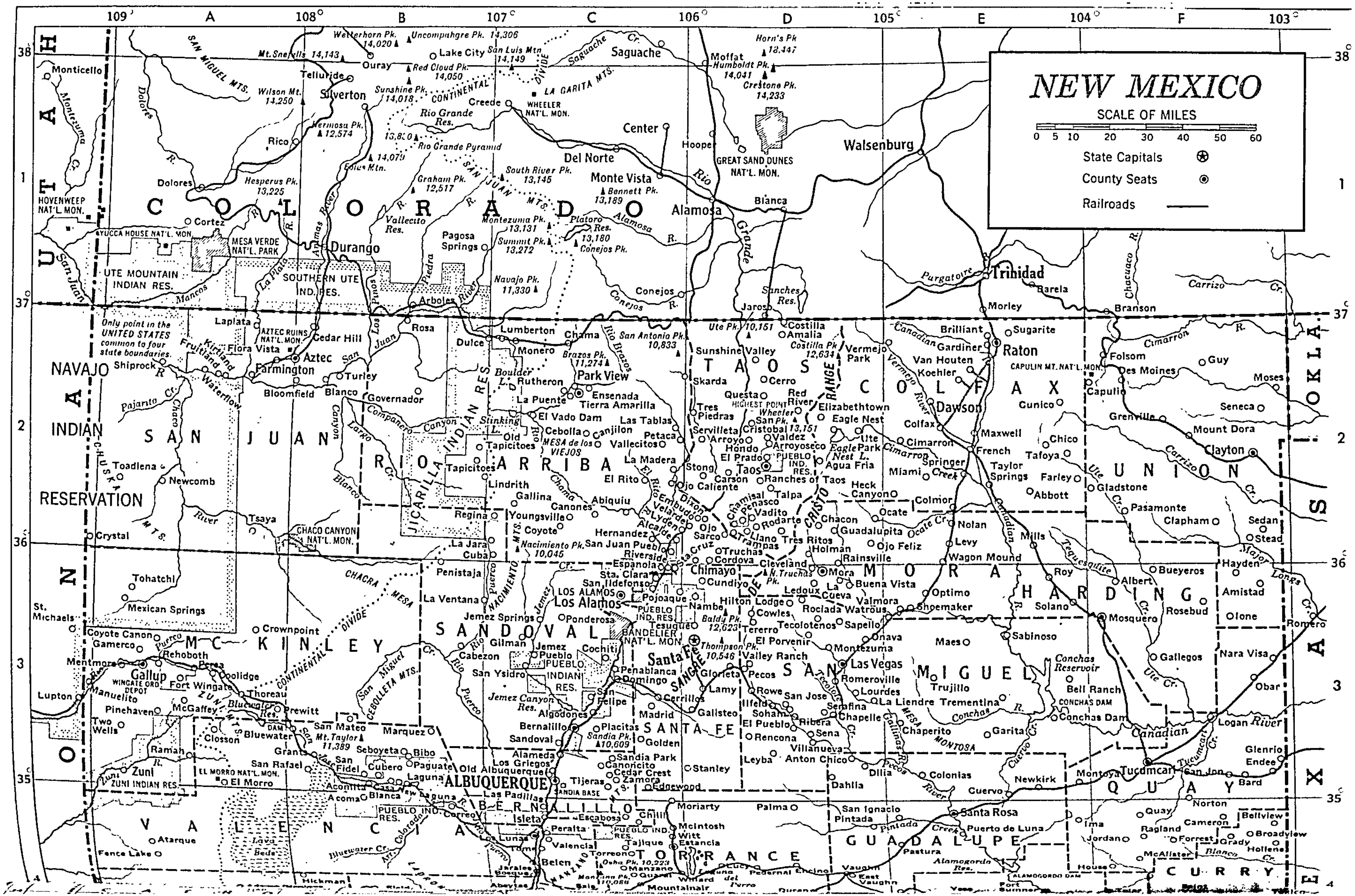
NEW MEXICO

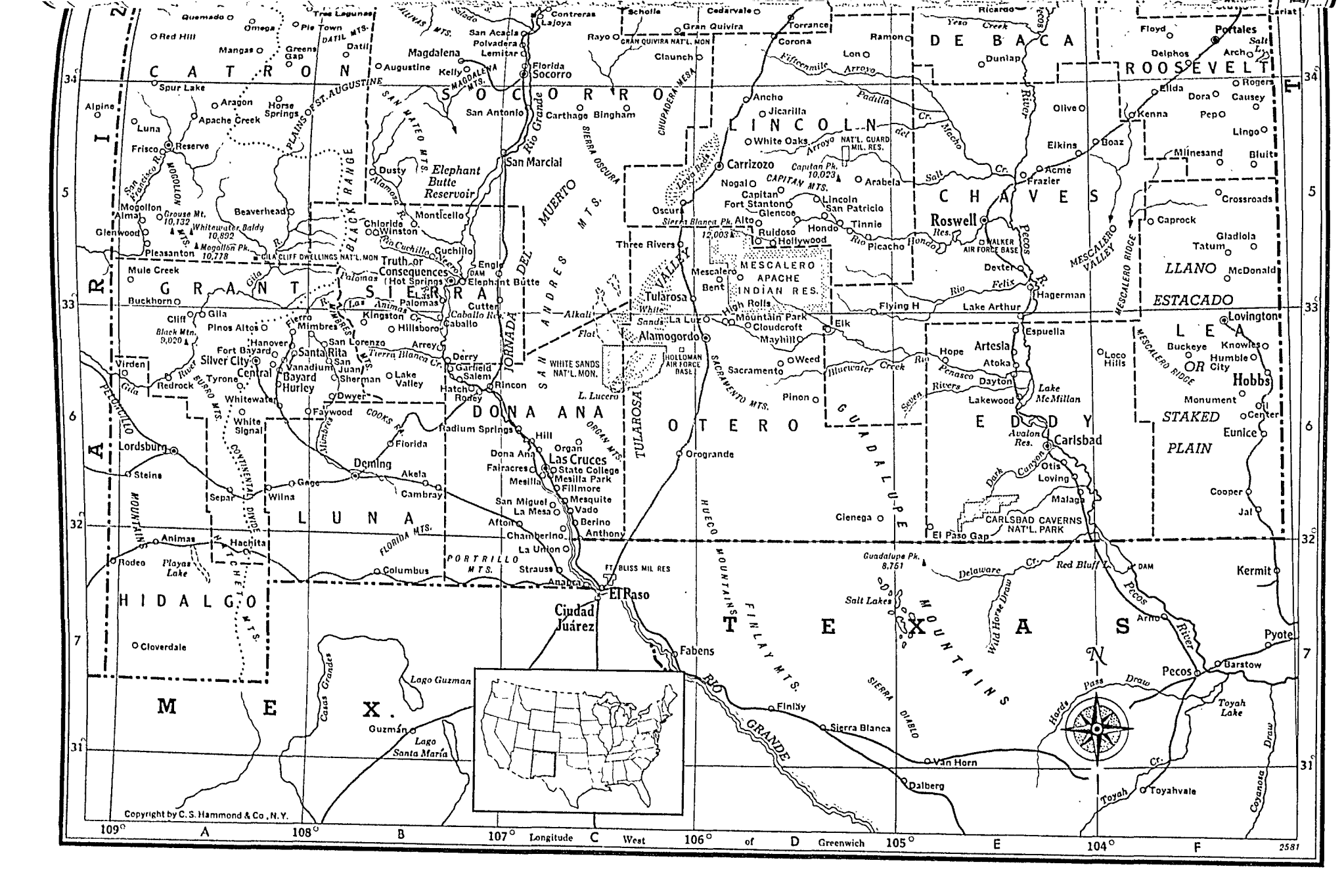
COUNTIES

Bernalillo	145,673	C 3
Catron	3,533	A 4
Chaves	40,605	E 5
Colfax	16,761	E 2
Curry	23,351	F 4
De Baca	3,464	E 4
Dona Ana	39,557	C 6
Eddy	40,640	E 6
Grant	21,649	A 5
Guadalupe	6,772	E 4
Harding	3,013	F 3
Hidalgo	5,095	A 7
Lea	30,717	F 6
Lincoln	7,409	D 5
Los Alamos	10,476	C 3
Luna	8,753	B 6
McKinley	27,451	A 3
Mora	8,720	E 3
Otero	14,909	D 6
Quay	13,971	F 3
Rio Arriba	24,997	B 2
Roosevelt	16,409	F 4
San Juan	18,292	A 2
San Miguel	26,512	D 3
Sandoval	12,438	C 3
Santa Fe	38,153	C 3
Sierra	7,186	B 5
Socorro	9,670	C 5
Taos	17,146	D 2
Torrance	8,012	D 4
Union	7,372	F 2
Valencia	22,481	A 4

CITIES AND TOWNS

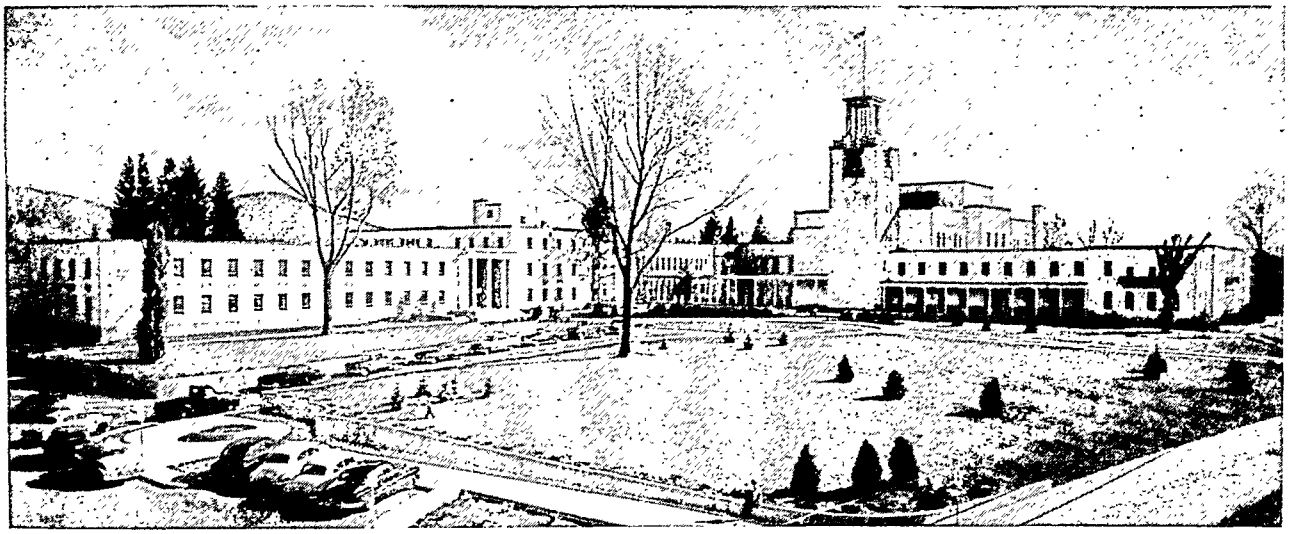
Abbott	9	E 2
Abeytas	125	C 4
Abiquiu	680	C 2
Abo	50	C 4
Acme		E 5
Acoma		B 4
Acomita	375	B 3
Adams Diggings	4	A 4
Afton	15	B 6
Agua Fria	27	D 2
Akela	40	B 6
Alameda	1,792	C 3
Alamogordo	6,783	C 6
Albert	35	F 3
Albuquerque	96,815	C 3
Alcalde	290	C 2
Algodones	250	C 3
Alma	50	A 5
Alto	50	D 5
Amalia	158	D 2
Amistad	33	F 3
Anapra		C 7
Ancho	100	D 5
Animas	99	A 7
Anthony	800	C 6
Anton Chico	600	D 3
Apache Creek	85	A 5
Arabela	60	D 5
Aragon	89	A 5
Arch	35	F 4
Arrey	350	B 6
Arroyo Hondo	500	D 2
Arroyoseco	400	D 2
Artesia	8,244	E 6
Atarque	100	A 4
Atoka	64	E 6
Augustine	11	B 4
Aztec	885	B 2
Bard	45	F 3
Bayard	2,119	A 6
Beaverhead		A 5
Belen	4,495	C 4
Bell Ranch	20	E 3
Bellview	150	F 4
Bent	250	D 5
Berino	300	C 6
Bernalillo	1,922	C 3
Bernardo	30	C 4
Bibo	50	B 3
Bingham	7	C 5
Blanco	135	B 2
Bloomfield	500	A 2
Bluewater	350	A 3
Bluit	335	F 5
Boaz	30	F 5
Bosque	400	C 4
Brilliant	225	E 2
Broadview	80	F 4
Buchanan		E 4
Buckeye	227	F 6
Buckhorn	500	A 5
Buena Vista	265	D 3
Bueyeros	38	F 3
Caballo		B 6
Cabezon	76	B 3
Cambray	8	B 6
Cameron	18	F 4
Canjilon	900	C 2
Canoncito	375	C 3
Canones	140	C 2
Capitan	575	D 5
Caprock	12	F 5
Capulin	200	F 2
Carlsbad	17,975	E 6
Carrizozo	1,389	D 5
Carson	25	D 2
Carthage	134	C 5
Casa Blanca	493	B 4
Causey	50	F 5
Cebolla	1,000	C 2
Cedar Crest	1,000	C 3
Cedar Hill	130	B 2
Cedarvale	50	D 4
Central	1,511	A 6
Cerrillos	817	D 3
Cerro	600	D 2
Chacon	85	D 2
Chama	1,300	C 2
Chamberino	1,000	C 6
Chamisal	500	D 2
Chapelle	25	D 3
Chaperito	125	E 3
Chico	6	E 2
Chilili	558	C 4
Chimayo	1,550	D 3
Chloride	56	B 5
Cienega	2	D 6
Cimarron	855	E 2
Clapham		F 2
Claunch	116	C 4
Clayton	3,515	F 2
Cleveland	700	D 2
Cliff	250	A 6
Closson		A 3
Cloudcroft	251	D 6
Cloverdale	60	A 7
Clovis	17,318	F 4
Cochiti	250	C 3
Colfax	13	E 2
Colmor	80	E 2
Colonias	150	E 3
Columbus	251	B 7
Conchas Dam	100	E 3
Contreras		C 4
Coolidge	8	A 3
Cooper	6	F 6
Cordova	585	D 2
Corona	530	D 4
Correo	8	B 4
Costilla	300	D 2
Cowles	200	D 3
Coyote	393	C 2
Coyote Canyon	38	A 3
Crossroads	60	F 5
Crownpoint	125	A 3
Crystal	125	A 2
Cuba	850	B 2
Cubero	605	B 3
Cuchillo	105	B 5
Cuervo	100	E 3
Cundiyo	160	D 3
Cunico	60	E 2
Cutter	55	B 5
Dahlia	100	D 3
Datil	80	B 4
Dawson	1,206	E 2
Dayton		E 6
Delphos	2	F 4
Deming	5,672	B 6
Derry	300	B 6
Des Moines	282	F 2
Dexter	784	E 5
Dilia	250	D 3
Dixon	1,250	D 2
Domingo	120	C 3
Dona Ana	400	C 6
Dora	120	F 5
Dulce	500	B 2
Dunlap	90	E 4
Duoro		D 4
Duran	300	D 4
Dusty	15	B 5
Dwyer	150	B 6
Eagle Nest	200	D 2
E. Vaughn	1,800	D 4
Edgewood	45	C 3
El Morro	300	A 3
El Paso Gap	12	E 6
El Porvenir	350	D 3
El Prado	13	D 2
El Pueblo	175	D 3
El Rito	1,200	C 2
El Vado Dam	18	C 2
Elephant Butte	150	B 5
Elida	430	F 5
Elizabethtown		D 2
Elk	35	D 6
Elkins	26	E 5
Embudo		C 2
Encino	408	D 4
Endee	50	F 3
Engle	65	B 5
Ensenada	400	C 2
Escabosa	86	C 4
Espanola	1,446	C 3
Espuella	50	E 6
Estancia	916	D 4
Eunice	2,352	F 6
Fairacres	350	C 6
Farley	111	E 2
Farmington	3,637	A 2
Faywood	61	B 6
Fence Lake	250	A 4
Field	300	B 4
Fierro	500	A 6
Fillmore	25	C 6
Flora Vista	150	A 2
Florida	15	B 6
Florida	350	C 4
Floyd	50	F 4
Flying H	55	E 5
Folsom	206	F 2
Forrest	130	F 4
Fort Bayard	483	A 6
Fort Stanton	500	D 5
Fort Sumner	1,982	E 4
Fort Wingate	250	A 3
Frazier	12	E 5
French	10	E 2
Frisco		A 5
Fruitland	200	A 2
Gage	100	A 6
Galisteo	150	D 3
Gallegos	143	F 3
Gallina	31	C 2
Gallup	9,133	A 3
Gamerco	200	A 3
Gardiner	50	E 2
Garfield	300	B 6
Garita	200	E 3
Gila	700	A 6
Gilman	119	C 3
Gladiola	99	F 5
Gladstone	61	F 2
Glencoe	200	D 5
Glenrio	60	F 3
Glenwood	300	A 5
Glorieta	500	D 3
Golden	75	C 3
Governador	45	B 2
Grady	130	F 4
Gran Quivira	50	D 4
Grants	2,251	B 3
Green Tree	363	D 5
Greens Gap	25	A 4
Grenville	102	F 2
Grier	200	F 4
Guadalupita	475	D 2
Guy	26	F 2
Hachita	200	A 7
Hagerman	1,024	E 5
Hanover	1,200	A 6
Hatch	1,064	B 6
Hayden	42	F 3
Heck Canyon		D 2
Hernandez	400	C 2
Hickman	17	B 4
High Rolls	175	D 5
Hill	100	C 6
Hillsboro	300	B 6
Hilton Lodge	2	D 3
Hobbs	13,875	F 6
Hollene	20	F 4
Hollywood	99	D 5
Holman	18	D 2
Hondo	250	D 5
Hope	186	E 6
Horse Springs	100	A 5
Hot Springs (Truth or Consequences)	4,563	B 5
House	295	F 4
Humble City	42	F 6
Hurley	2,079	A 6
Ilfeld		D 3
Ima	4	E 4
Ione	3	F 3
Isleta	1,400	C 4
Jal	2,047	F 6
Jarales	1,199	C 4
Jemez Pueblo	878	C 3
Jemez Springs	135	C 3
Jicarilla	20	D 5
Jordan	93	F 4
Kelly	55	B 4
Kenna	100	F 5
Kingston	50	B 6
Kirtland	317	A 2
Knowles	10	F 6
Koehler	385	E 2
La Cueva	11	D 3
La Jara	2,500	B 2


NEW MEXICO
SCALE OF MILES
0 5 10 20 30 40 50 60
State Capitals
County Seats
Railroads
COLORADO
UTAH
OKLA.
TEXAS
ARIZONA
SAN JUAN
RIO ARRIBA
TAOS
COLFAX
UNION
MORA
HARDING
SANDOVAL
LOS ALAMOS
SANTA FE
SAN MIGUEL
QUAY
McKINLEY
VALENCIA
BERNALILLO
TORRANCE
GUADALUPE
CURRY
NAVAJO INDIAN RESERVATION
JICARILLA INDIAN RES.
UTE MOUNTAIN INDIAN RES.
SOUTHERN UTE IND. RES.
ZUNI INDIAN RES.
Only point in the UNITED STATES common to four state boundaries.
Santa Fe
ALBUQUERQUE
Gallup
Farmington
Aztec
Raton
Clayton
Taos
Las Vegas
Santa Rosa
Tucumcari
Mosquero
Los Alamos
Bernalillo
Durango
Trinidad
Walsenburg
Alamosa
Rio Grande


CATRON
SOCORRO
LINCOLN
DE BACA
ROOSEVELT
GRANT
SIERRA
DONA ANA
OTERO
CHAVES
EDDY
LEA
LUNA
HIDALGO
MEX.
TEXAS
Quemado
Tres Lagunas
Omega
Pie Town
Red Hill
Datil
Mangas
Greens Gap
Alpine
Spur Lake
Aragon
Horse Springs
Apache Creek
Luna
Frisco
Reserve
Magdalena
Augustine
Kelly
San Acacia
Polvadera
Lemitar
Socorro
Contreras
La Joya
Scholle
Cedarvale
Rayo
Gran Quivira
Torrance
Corona
Claunch
Ramon
Lon
Dunlap
Ricardo
Yeso Creek
Floyd
Portales
Salt Lk.
Delphos
Arch
Elida
Dora
Causey
Rogers
Kenna
Pep
Lingo
Olive
Elkins
Boaz
Milnesand
Bluitt
Acme
Frazier
Crossroads
Caprock
Gladiola
Tatum
McDonald
LLANO ESTACADO
Lovington
Buckeye
Knowles
Humble City
Hobbs
Monument
Center
Eunice
STAKED PLAIN
Jal
Cooper
Hagerman
Lake Arthur
Flying H
Roswell
Walker Air Force Base
Dexter
Hondo
Tinnie
Ruidoso
Hollywood
Picacho
Nogal
Capitan
Fort Stanton
Glencoe
Lincoln
San Patricio
Arabela
Capitan Ph. 10,023
Capitan Mts.
Carrizozo
Ancho
Jicarilla
White Oaks
Nat'l. Guard Mil. Res.
San Antonio
Carthage
Bingham
San Marcial
Elephant Butte Reservoir
Dusty
Alamosa R.
Rio Grande
Chupadera Mesa
Padilla Cr.
Fifteenmile Arroyo
Yeso Creek
Three Rivers
Oscura
Sierra Blanca Pk. 12,003
Mescalero
Bent
Mescalero Apache Indian Res.
Tularosa
White Sands
La Luz
Alamogordo
Mountain Park
Cloudcroft
Mayhill
Elk
Sacramento
Weed
Hope
Artesia
Atoka
Espuella
Loco Hills
Bluewater Creek
Penasco Rivers
Dayton
Lakewood
Lake McMillan
Pinon
Orogrande
Avalon Res.
Carlsbad
Otis
Loving
Malaga
Dark Canyon
Carlsbad Caverns Nat'l. Park
El Paso Gap
Cloverdale
Lordsburg
Steins
Separ
Wilna
Gage
Deming
Akela
Cambray
Florida
Radium Springs
Hill
Organ
Dona Ana
Las Cruces
State College
Mesilla Park
Fillmore
Fairacres
Mesilla
Mesquite
Vado
Berino
Anthony
San Miguel
La Mesa
Afton
Chamberino
La Union
Strauss
Anapra
Ft. Bliss Mil Res
El Paso
Ciudad Juárez
Fabens
Clenega
Guadalupe Pk. 8,751
Delaware Cr.
Red Bluff Dam
Salt Lakes
Wild Horse Draw
Kermit
Arno
Pyote
Barstow
Pecos
Pass Draw
Toyah Lake
Toyah
Toyahvale
Coyanosa Draw
Finlay Mts.
Sierra Diablo
Sierra Blanca
Van Horn
Dalberg
Rio Grande
Lago Guzman
Lago Santa María
Guzmán
Casas Grandes
Animas
Hachita
Rodeo
Playas Lake
Columbus
Portrillo Mts.
Florida Mts.
Continental Divide
Hachita Mts.
Peloncillo Mts.
Burro Mts.
Gila
Virden
Redrock
Tyrone
Silver City
Central
Bayard
Hurley
Whitewater
White Signal
Dwyer
Faywood
Cooks Pk.
Hanover
Fort Bayard
Santa Rita
Vanadium
San Juan
Sherman
Lake Valley
Pinos Altos
Cliff
Gila
Mule Creek
Buckhorn
Mogollon
Alma
Glenwood
Pleasanton
Mogollon Mts.
Grouse Mt. 10,132
Whitewater Baldy 10,892
Mogollon Pk. 10,778
Gila Cliff Dwellings Nat'l. Mon.
Black Mtn. 9,020
Beaverhead
Chloride
Winston
Montcello
Cuchillo
Cuchillo Negro R.
Truth or Consequences
Hot Springs
Elephant Butte Dam
Engle
Cutter
Palomas
Las Animas Cr.
Kingston
Hillsboro
Caballo
Caballo Res.
Derry
Garfield
Salem
Rincon
Hatch
Rodey
Arrey
San Lorenzo
Mimbres
Fierro
Tierra Blanca Cr.
Las Animas R.
Gila R.
Palomas R.
Alkali Flat
White Sands Nat'l. Mon.
Holloman Air Force Base
L. Lucero
Jornada del Muerto
San Andres Mts.
Sierra Oscura
Organ Mts.
Sacramento Mts.
Guadalupe Mts.
Huco Mountains
Tularosa Valley
Mescalero Ridge
Mescalero Valley
Black Range
Chloride Mts.
Mimbres Mts.
Magdalena Mts.
San Mateo Mts.
Chupadera Mesa
Datil Mts.
Plains of St. Augustine
Continental Divide
Rio Grande
Pecos River
Copyright by C. S. Hammond & Co., N.Y.
109°
108°
107°
106°
105°
104°
Longitude West of Greenwich
A
B
C
D
E
F
34
33
32
31
7
6
5
2581

La Lande	35	E 4
La Liendre	12	E 3
La Luz	200	C 6
La Madera	423	C 2
La Mesa	650	C 6
La Puente	300	C 2
La Union	475	C 7
La Ventana	6	B 3
Laguna	3,004	B 3
Lajoya	63	C 4
Lake Arthur	380	E 5
Lake Valley	9	B 6
Lakewood	33	E 6
Lamy	105	D 3
Laplata	162	A 2
Las Cruces	12,325	C 6
Las Padillas	487	C 3
Las Palomas	60	B 5
Las Tablas	100	C 2
Las Vegas (City)	7,494	D 3
Las Vegas (Town)	6,269	D 3
Ledoux	800	D 3
Lemitar	500	B 4
Levy	15	E 2
Leyba		D 3
Lincoln	80	D 5
Lindrith	300	C 2
Lingo	20	F 5
Llano	550	D 2
Loco Hills	300	F 6
Logan	500	F 3
Lon		D 4
Lordsburg	3,525	A 6
Los Alamos	9,934	C 3
Los Griegos	3,025	C 3
Los Lunas	889	C 4
Lourdes		D 3
Loving	1,487	E 6
Lovington	3,134	F 6
Lucy	10	D 4
Lumberton		C 2
Luna	300	A 5
Lyden		C 2
Madrid	477	C 3
Maes	50	E 3
Magdalena	1,297	B 4
Malaga	250	E 6
Mangas	25	A 4
Manuelito	27	A 3
Manzano	250	C 4
Marquez	60	B 3
Maxwell	404	E 2
Mayhill	263	D 6
McAlister		F 4
McDonald	100	F 5
McGaffey	50	A 3
McIntosh	25	D 4
Melrose	936	F 4
Mentmore	100	A 3
Mescalero	1,170	D 5
Mesilla	1,264	C 6
Mesilla Park	2,000	C 6
Mesquite	400	C 6
Mexican Springs	27	A 3
Miami	111	E 2
Mills	95	E 2
Milnesand	27	F 5
Mimbres	36	B 6
Mogollon	26	A 5
Monero	207	C 2
Montezuma	1,200	D 3
Monticello	400	B 5
Montoya	75	F 3
Monument	364	F 6
Mora	1,750	D 3
Moriarty	210	D 4
Moses	70	F 2
Mosquero	583	F 3
Mount Dora	100	F 2
Mountain Park	60	D 6
Mountainair	1,418	C 4
Mule Creek	16	A 5
Nambe	500	D 3
Nara Visa	350	F 3
New Laguna	150	B 3
Newcomb	200	A 2
Newkirk	250	E 3
Nogal	25	D 5
Nolan	11	E 2
Norton	7	F 4
Obar	5	F 3
Ocate	105	E 2
Oil Center	70	F 6
Ojo Caliente	282	D 2
Ojo Feliz	365	E 2
Ojo Sarco	150	D 2
Old Albuquerque	1,242	C 3
Old Tapicitoes		C 2
Olive	12	E 5
Omega	30	A 4
Onava		D 3
Optimo		E 3
Organ	50	C 6
Orogrande	45	D 6
Oscura	50	C 5
Otis	150	E 6
Paguate	500	B 3
Palma		D 4
Park View	300	C 2
Pasamonte	12	F 2
Pastura	120	E 4
Pecos	1,241	D 3
Pedernal	30	D 4
Penablanca	350	C 3
Penasco	700	D 2
Penistaja		B 3
Pep	30	F 5
Peralta	300	C 4
Perea	15	A 3
Petaca	204	C 2
Picacho	175	D 5
Pie Town	135	A 4
Pinehaven	61	A 3
Pinon	100	D 6
Pinos Altos	250	A 6
Pintada		D 4
Placitas	350	C 3
Pleasanton	48	A 5
Pojoaque	200	C 3
Polvadera	148	B 4
Ponderosa	100	C 3
Portales	8,112	F 4
Prewitt	65	B 3
Puerto de Luna	600	E 4
Quarai	55	C 4
Quay	120	F 4
Quemado	400	A 4
Questa	1,400	D 2
Radium Springs	28	B 6
Ragland	12	F 4
Rainsville	350	D 2
Ramah	300	A 3
Ramon		D 4
Ranches of Taos	1,386	D 2
Raton	8,241	E 2
Rayo		C 4
Red Hill	300	A 4
Red River	150	D 2
Redrock	17	A 6
Regina	100	B 2
Rehoboth	90	A 3
Rencona	32	D 3
Reserve	202	A 5
Ribera	400	D 3
Ricardo	25	E 4
Rincon	500	C 6
Riverside		C 2
Rociada	40	D 3
Rodarte	750	D 2
Rodeo	250	A 7
Rodey	250	B 6
Rogers	71	F 5
Romeroville	18	D 3
Rosa	100	B 2
Rosebud		F 3
Roswell	25,738	E 5
Rowe	365	D 3
Roy	1,074	E 3
Ruidoso	806	D 5
Rutheron	25	C 2
Sabinoso	125	E 3
Sacramento	44	D 6
Saint Vrain	48	F 4
Sais		C 4
Salem	350	B 6
San Acacia	200	B 4
San Antonio	900	B 5
San Cristobal	215	D 2
San Felipe	500	C 3
San Fidel	89	B 3
San Ignacio		D 4
San Ildefonzo	400	C 3
San Jon	362	F 3
San Jose	246	D 3
San Juan		B 6
San Juan Pueblo	1,200	C 2
San Lorenzo	350	B 6
San Marcial	157	C 5
San Mateo	150	B 3
San Miguel	300	C 6
San Patricio	300	D 5
San Rafael	500	A 3
San Ysidro	360	C 3
Sandia Park	100	C 3
Sandoval		C 3
Santa Clara	635	C 3
Santa Cruz	387	D 3
SANTA FE	27,998	C 3
Santa Rita	2,135	B 6
Santa Rosa	2,199	E 4
Sapello	80	D 3
Scholle	47	C 4
Seboyeta	456	B 3
Sedan	100	F 2
Sena	190	D 3
Seneca	20	F 2
Separ	50	A 6
Serafina	100	D 3
Servilleta	15	D 2
Sherman	47	B 6
Shiprock	250	A 2
Shoemaker	200	E 3
Silver City	7,022	A 6
Skarda	25	D 2
Socorro	4,334	C 4
Soham	250	D 3
Solano	40	E 3
Springer	1,558	E 2
Spur Lake	3	A 5
Stanley	75	D 3
State College	1,200	C 6
Stead	11	F 2
Steins	63	A 6
Stong		D 2
Strauss		C 7
Sugarite	10	E 2
Sunshine Valley	20	D 2
Tafoya	325	E 2
Taiban	227	F 4
Tajique	250	C 4
Talpa	21	D 2
Taos	1,815	D 2
Tapicitoes	411	B 2
Tatum	688	F 5
Taylor Sprs.	25	E 2
Tecolotenos	95	D 3
Tererro	40	D 3
Tesuque	637	C 3
Texico	691	F 4
Thoreau	150	A 3
Three Rivers	350	C 5
Tierra Amarilla	800	C 2
Tijeras	340	C 3
Tinnie	80	D 5
Toadlena	500	A 2
Tohatchi	350	A 3
Tolar	46	F 4
Tome	400	C 4
Torrance	10	D 4
Torreon	100	C 4
Trampas		D 2
Trementina		E 3
Tres Lagunas	14	B 4
Tres Piedras	75	D 2
Tres Ritos	50	D 2
Truchas	750	D 2
Trujillo	500	E 3
Truth or Consequences	4,563	B 5
Tsaya	50	A 2
Tucumcari	8,419	F 3
Tularosa	1,642	C 5
Turley		B 2
Two Wells	61	A 3
Tyrone	32	A 6
Ute Park		D 2
Vadito	500	D 2
Vado	350	C 6
Valdez	360	D 2
Valencia	818	C 4
Vallecitos	400	C 2
Valley Ranch	42	D 3
Valmora	100	D 3
Van Houten	485	E 2
Vanadium	450	A 6
Vaughn	1,356	D 4
Veguita	21	C 4
Velarde	600	C 2
Vermejo Park	300	D 2
Villanueva	543	D 3
Virden	146	A 6
Wagon Mound	1,120	E 2
Waterflow	150	A 2
Watrous	250	D 3
Weed	100	D 6
White Oaks	61	D 5
White Signal	23	A 6
Whitewater	40	A 6
Willard	296	D 4
Wilna	8	A 6
Winston	150	B 5
Witt	12	D 4
Yeso	500	E 4
Youngsville	120	C 2
Zamora		C 3
Zuni	2,563	A 3

NEW MEXICO'S CAPITOL IN TERRITORIAL ARCHITECTURE



Behind the tower is the old Capitol, built in 1900 and remodeled in 1953 in an architectural style native to the state. The tower has a glassed observation room and behind it are legislative chambers. On the far right is the governor's office.

an old Mexican settlement and a modern city. Once a stopover on the Santa Fe Trail, today it is a health resort and shipping point for sheep and cattle (*see* Far West). Northwest of Santa Fe is Los Alamos, "capital of the Atomic Age." Here the first atomic bomb was made during World War II. It is an atomic energy research laboratory. At Albuquerque is Sandia Laboratory for guided missile experiments.

In southeast New Mexico are Roswell, seat of New Mexico Military Institute and an oil-refining and meat-packing center; Carlsbad, tourist gateway to Carlsbad Caverns National Park and important for potash and oil; and Hobbs, the "oil capital of New Mexico" (*see* National Parks; Cave). Farther north is Clovis, a livestock and railroad center.

Still the Home of Indian Tribes

New Mexico was inhabited long before the day of Columbus, as the ancient pueblo ruins and cliff dwellings testify (*see* Cliff Dwellers). The many ruins and remains of ancient peoples are of great archaeologic importance. Several of them are national monuments including the prehistoric pueblo, or village, ruins of Tabira (the so-called Gran Quivira), the Gila Cliff Dwellings, and El Morro (the Inscription Rock on which Spanish records of 1605 are legible).

The peaceful Pueblo Indians dwelt and farmed here when the Spaniards came (*see* Pueblo Indians; Indians). The Pueblos needed no lessons in industry from white men. They still retain their farming ways, communal village life, tribal customs, and picturesque costumes.

Their once-troublesome neighbors, the Navajos, now live on a reservation, extending from Arizona into New Mexico. Here they till the soil and carry on primitive industries, including the weaving of the famous Navajo blankets. More warlike were their kinsmen, the fierce Apaches. Their raids forced the Pueblos to build dwellings in rocky places, hard to approach and easy to defend. General Nelson A. Miles finally subdued the Apaches in 1886. Their chief, Geronimo, was imprisoned at Fort Sill in the Oklahoma country. Two Apache tribes, the Jicarillas and Mescaleros, are now on reservations in New Mexico.

New Mexico's History of Early Exploration

Early in the 16th century the Spaniards were attracted to the land north of Mexico by tales of cities of fabulous wealth. Cabeza de Vaca was the first white man to see New Mexico. He reached the Gulf of California in 1536 and told of the rich cities he had heard about from Indians. Marcos de Niza unsuccessfully sought these cities in 1539. Coronado, who followed him the next year, failed to find gold but conquered New Mexico (*see* Coronado).

The first colonizer of New Mexico was a wealthy Mexican, Juan de Oñate, who came with 400 colonists in 1598. In 1609 Santa Fe was founded and made capital of the province. The Pueblo Indians long resisted the Spaniards. Twelve years later, however, the Mexican viceroy re-established his authority.

In 1846, during the Mexican War, Gen. Stephen W. Kearny seized the province for the United States (*see* Mexican War). New Mexico (then including Arizona) was ceded to the United States by the Treaty of Guadalupe-Hidalgo in 1848, and in 1850 the Territory of New Mexico was created. The present southern boundary was established by the Gadsden Purchase in 1853.

In 1861 a northeast section of New Mexico Territory was annexed by the new Colorado Territory. New Mexico Territory was again cut when the Territory of Arizona was created in 1863. During the Civil War Santa Fe, in 1862, was occupied successively by Confederate and Federal forces. In 1863, after the Confederates had been forced back into Texas, Union troops compelled the Navajos to accept life within a reservation. The Apaches proved more troublesome and broke out in many raids. The last was in 1885–86, when capture of Chief Geronimo ended their war making. After many attempts New Mexico was admitted to the Union in 1912. (*See also* chronology in New Mexico Fact Summary; United States, sections "Rocky Mountains" and "Western Basins and Plateaus.")

The QUEEN CITY *of the* GULF

NEW ORLEANS, LA. When the United States bought Louisiana in 1803, President Thomas Jefferson made a prediction about the little French settlement on the lower Mississippi. He said that New Orleans would grow into a great metropolis. The city has more than done so. It is one of the world's great shipping centers. Its port is second in the United States in value of goods handled. Manufactures run into millions of dollars a year. And its jealously-guarded Old World color and charm make it a favorite for tourists and conventions in keeping with its claim to be "America's Most Interesting City."

The city owes much to its fortunate geographical position. It is the gateway to the Mississippi Valley, the richest river valley in the world. The markets of Latin America lie just across the Gulf of Mexico, and the Panama Canal provides a handy waterway to the trading centers of the Orient. Its port also handles giant quantities of goods shipped to or from European nations.

The original settlement was built along the eastern bank of the Mississippi in a great U-shaped bend in the river, 110 miles from its mouth. Many streets followed the curve of the river, giving New Orleans the name, "the Crescent City." Much of the city lies below the river level; but many miles of great levees or dikes keep out the waters.

An Outstanding Port

The city has two outlets to the gulf. One follows the Mississippi, crossing its delta through Southwest Pass or South Pass. The other passage is the Intracoastal Waterway. One route of this waterway is by way of the Inner Harbor Navigation (or Industrial) Canal, completed in 1923, to lakes Pontchartrain and Borgne. Another route passes part way through the canal and then follows Vickery Canal.

The Port of New Orleans is operated by the Board of Port Commissioners. It attained a new height of importance in the second World War as a point of embarkation for men and war materials. During the war years thousands of vessels cleared the port annually and carried more than 20 million tons of cargo.

More than 11 miles of wharves, warehouses, and huge steel transit sheds provide facilities for handling the flood of products that passes through New Orleans each year. The city is one of the nation's greatest markets for cotton, sugar, grains, and burlap. It also handles great quantities of molasses, bananas, and coffee. In addition, it is the shipping

FACTS ABOUT NEW ORLEANS

Population (1950 census)—570,445.

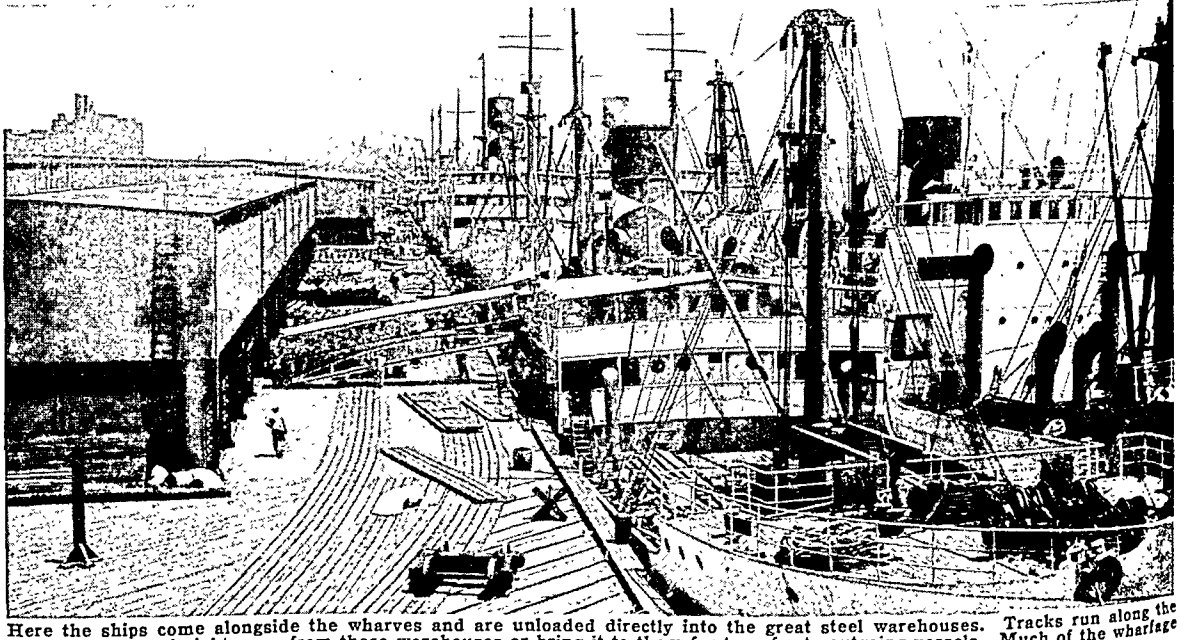
Area—363.5 sq. mi. (Parish of Orleans).

Geographic Location (Old United States Mint)—29° 57′ 46″ N., 90° 3′ 28″ W.

Climate—*Mean temperatures:* annual, 69.7°; highest monthly, 82.7° (Aug.); lowest monthly, 55.1° (Jan.). *Mean rainfall:* annual, 60.46 inches; highest monthly, 6.70 inches (July); lowest monthly, 3.48 inches (Oct.).

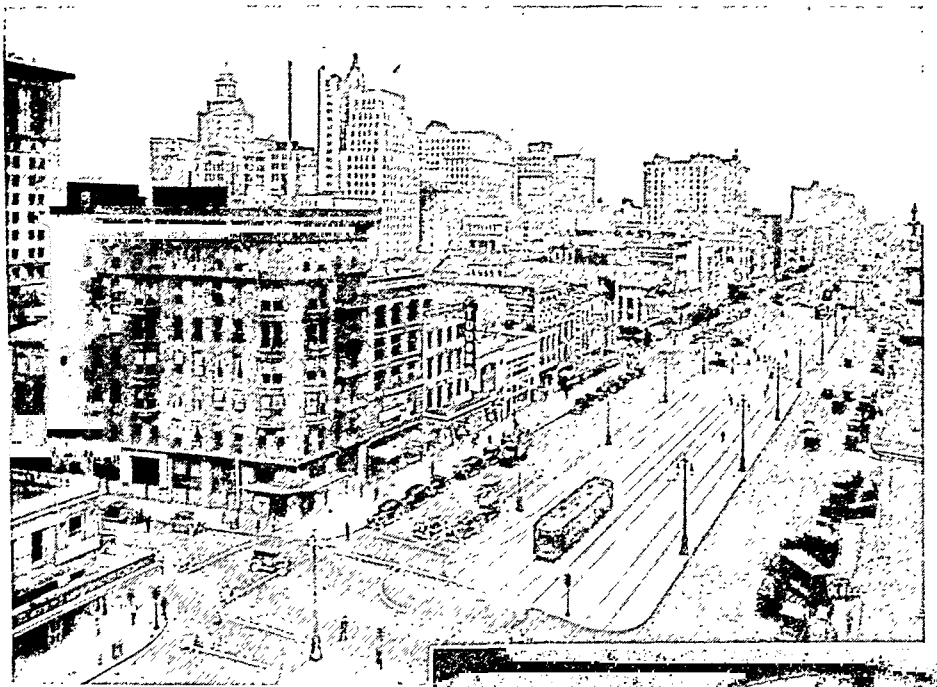
Port and Shipping—About 61 miles of water front, about 130 wharves, 11 miles of berthing space. *Annual shipping*—total about 30 million tons; exports and imports about 8 million tons. *Distance to Gulf of Mexico* from Canal Street by way of Mississippi River—110 miles via Southwest Pass, 107 miles via South Pass; by way of Intracoastal Waterway—70 miles via Lake Pontchartrain. 60 miles via Vickery Canal.

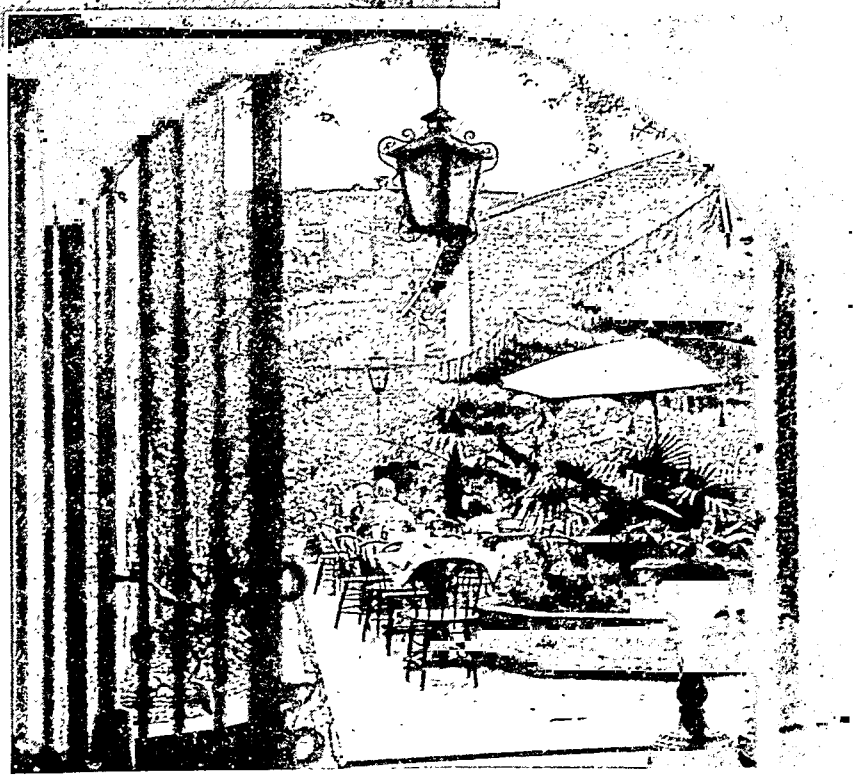
ON THE BUSY WHARVES OF NEW ORLEANS



Here the ships come alongside the wharves and are unloaded directly into the great steel warehouses. Tracks run along the wharves to carry freight away from these warehouses or bring it to them for transfer to outgoing vessels. Much of the wharfage is equipped with the most modern freight-handling facilities.

GLIMPSES OF NEW ORLEANS, NEW AND OLD





The upper picture shows some of the buildings along Canal Street, the axis of the city. This street runs north and south and divides the city sharply into two parts—the French quarter to the east and the modern portion to the west. You can judge the street's tremendous width by noticing that even with four car tracks, it has ample roadways for automobiles. The lower picture shows a characteristic patio in the older section of the city, now used as a public restaurant.

and selling center for Louisiana's petroleum, rice, and lumber. Great dry docks are available to service and repair ships.

To stimulate import trade New Orleans established a free port zone in 1946. Here importers are permitted to store cargo duty free. No tariff is paid unless the goods are later sold in the United States. International House, established in 1944, is a meeting place and business exchange for foreign visitors. The International Mart, opened in 1948, is used to exhibit and market foreign products. It is the first of its kind in the world.

New Orleans is connected with the interior of the country by a fan-shaped network of nine railroads. The Public Belt Railroad, owned by the city, connects all rail lines with the docks. It also utilizes the $13,000,000 Huey P. Long Bridge across the Mississippi. Coastwise steamers link New Orleans with other seaports in the United States. River barge lines operate on regular schedules between the city and points on 13,000 miles of inland waterways. Modern airports make New Orleans a transit center between the United States and Latin America. It is as close to Guatemala City as it is to Chicago.

In and around New Orleans is one of the South's great industrial areas. About 800 plants turn out hundreds of different products from tin cans to hosiery. Sugar-cane refining and shipbuilding are leading industries. Wallboard, made from sugar-cane refuse, is an unusual New Orleans product. The city is a leader in the production of men's wash suits, cottonseed products, industrial alcohol, and burlap and cotton bags. New Orleans is noted as the southern center for the production of fine furniture, both modern and period.

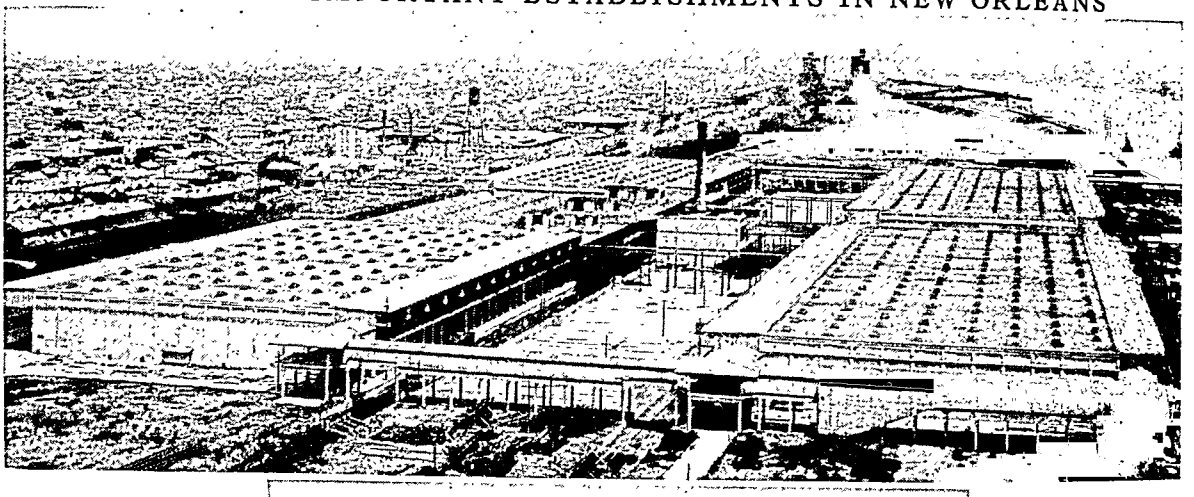
A City of Contrasts

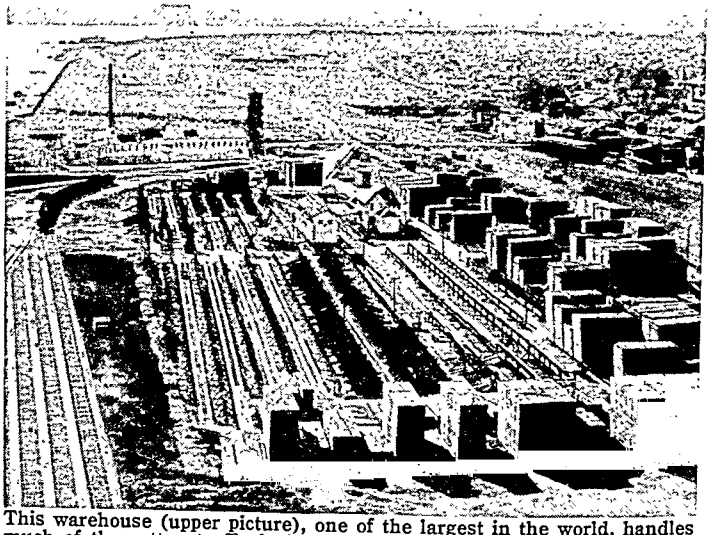
New Orleans is a city of striking contrasts. The old and new sections lie roughly on either side of Canal Street, a broad thoroughfare running north from the river.

The modern section, largely to the west of Canal Street, has towering skyscrapers, broad palm-bordered streets, and extensive, well-kept parks. East of Canal Street lies old New Orleans. Here live American-born descendants of the French and Spanish (Creoles), who still cling to the speech and customs of their forefathers.

This old French quarter, or *Vieux Carré* ("Old Square" in French), is really a city in itself. It occupies a small, quiet section, hemmed in by the busy modern

TWO WORLD-IMPORTANT ESTABLISHMENTS IN NEW ORLEANS





This warehouse (upper picture), one of the largest in the world, handles much of the cotton traffic in New Orleans. Part of this huge structure serves as a foreign trade zone (free port). The lower picture shows an important mahogany distributing plant. The mill saws logs from Central and South America into the stacked piles of lumber you see here.

metropolis. Dark, narrow streets, many paved with flagstones, separate crowded rows of distinctive old buildings erected more than a century ago. Many streets were named for old French and Spanish officials. The dwellings are patterned after the houses of southern France, Spain, and Italy. Heavy iron-bound doors covered with clinging vines of roses and ivy open abruptly on the uneven sidewalks. Behind these great gates are fine old courtyards or patios that usually have crumbling walks, fountains, statues, and bright green tropical plants. Overhead are picturesque balconies with railings of finely wrought iron. (Iron was useful as well as ornamental because it could withstand the dampness of the climate and the attack of termites.) The gabled roofs and red-brick chimneys of the old mansions add to the Old World atmosphere of the district.

The old "commons," or *Place d'Armes*, in the Vieux Carré was the setting of nearly every important event in the history of Louisiana. Later the commons was renamed Jackson Square. It is a modern park with colorful flower beds, white cement walks, and neatly trimmed shrubbery. The historic old buildings surrounding the square still stand. Here are the Pontalba Buildings, America's first apartments; St. Louis Cathedral, built in 1794; and the Cabildo, the Spanish courthouse where Louisiana was transferred from Spain to France and then to the United States. The last is now a museum. Another point of interest to tourists is the old French Market, built in 1791. It is still in use although modernized to some extent.

The Old World heritage of the Latin Quarter is celebrated each year in the Mardi Gras, famous throughout the world. It is a great fun festival of private balls, street pageants, and public masking. The season comes to a climax the day before Lent on "Fat Tuesday" ("Mardi gras" in French).

New Orleans is both a summer and winter resort. Golf, baseball, and fishing are popular the year round. The highlight of the winter season is the Carnival of Sports, which features the Sugar Bowl football game on New Year's Day.

The city is the seat of Tulane University and its branch for women, Newcomb Memorial College. The Louisiana State University medical center, the Delgado Trade School for boys, and the Rabouin technical school for girls are also here. The Catholic school system consists of Loyola University and more than 50 other schools and convents. Dillard University and Xavier University are for Negroes.

City Park contains the Delgado Museum of Fine Arts and the ancient "dueling oaks" under which affairs of honor were once settled. A short drive brings one to the Bayou Teche country of the Acadians, land of Longfellow's 'Evangeline'; Bayou Barataria, picturesque haunt of the pirates Jean and Pierre Lafitte; and Chalmette, where the battle of New Orleans was fought in January 1815. An interesting point about this

battle is that it occurred 15 days after Great Britain and the United States had made peace.

The Story of New Orleans' Growth

New Orleans was founded in 1718 by Jean Baptiste Lemoyne, Sieur de Bienville. In 1722 it was made the capital of the great Louisiana territory and became the industrial and political center of the French colony. In 1762 during the Seven Years' War, France ceded her territories west of the Mississippi, including New Orleans, to her ally Spain. The city remained under Spanish rule for 40 years. During this time, in 1788, a terrible fire destroyed a large portion of the city. But New Orleans quickly took on a new and greater growth. In 1800 Napoleon forced Spain by a secret treaty to restore Louisiana to France.

Soon after France took formal possession in 1802, the United States bought the territory (*see* Louisiana; Louisiana Purchase). At that time the city's population was less than 10,000, mostly French Creoles and their slaves. Meanwhile the growth of flatboat commerce on the Mississippi was making New Orleans an important trade center. The prosperity of the city was assured in 1812 when the first steamboat arrived from Pittsburgh. New Orleans served as the capital of Louisiana at various times until the constitution of 1879 established Baton Rouge as the permanent state capital.

In the Civil War New Orleans was an important federal strategic point after its capture in 1862. But the war paralyzed the city's commerce. It was not until the '70's that the city regained its former place as a commercial center. Epidemics of yellow fever, long the scourge of New Orleans (1878–1906), were ended when the United States Marine Hospital Service took charge and abolished the breeding places of the mosquito which carried the plague. Similarly in 1914 the United States Health Service destroyed many unsanitary structures in its campaign to rid the city of rats, the carriers of bubonic plague. In 1927 New Orleans, to save itself from a Mississippi flood, diverted the water upon two parishes to the southeast of the city. Through taxes it provided new homes for the people thus driven from their land. To prevent a repetition of this flood United States Army Engineers built the Bonnet Carré Spillway about 35 miles upstream. This huge structure removes the flood crests from the river before they reach the city.

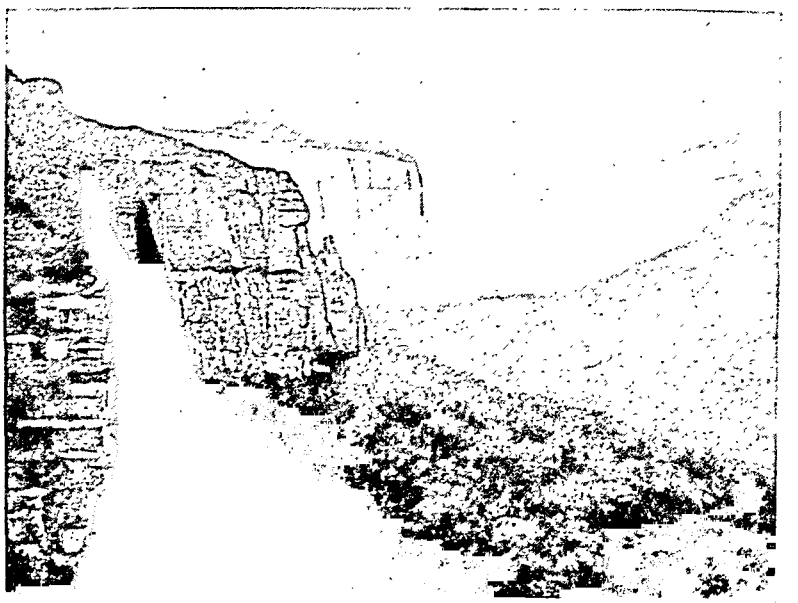
A commission consisting of a mayor and seven commissioners governs New Orleans. The commissioners also administer the departments of public finance, safety, utilities, streets, sanitation, public buildings, and institutions and public health.

NEW SOUTH WALES, AUSTRALIA. The oldest and most populous British colony in Australia is now an original state of the Australian Commonwealth. It has an area of 309,432 square miles—about twice the size of California—with a population of 2,984,838 (1947 census). Much of the land is devoted to sheep- and cattle-raising, since little of it is sufficiently watered for farming. Wheat is the chief crop grown, and wool is the chief export. The coal fields are the chief source of mineral wealth. In the production of coal, as well as of silver-lead ore, New South Wales leads the states of the Australian Commonwealth. Silver, gold, tin, zinc, and other minerals are also mined.

There are forests of eucalyptus and other trees, and timber is an important export. New South Wales on account of its harbors and resources has the largest trade of any of the Australian states. The state government owns many public utilities, and provides old-age and widows' pensions and special relief for poor families. The school system is headed by the University of Sydney. The chief cities are Sydney (capital), Newcastle, and Broken Hill.

New South Wales shares the characteristic formation of eastern Australia—that of a narrow coastal plain, backed by the Great Dividing Range of mountains about 100 miles inland. The rapidly changing levels give the state a great diversity of climate, from Sydney's mean temperature of 63° at the seacoast to inland temperatures ranging as high as 130°. The difference between average summer and winter temperatures at Sydney is 17°. Rainfall varies from 64 inches a year in one district in the south to 32.5 inches on the table-lands and 10 inches in the west. (*See* Australia.)

A GLIMPSE OF THE "BLUE MOUNTAINS"



This beautiful valley is typical of the scenery to be found in the great mountain range which skirts the whole eastern coast of Australia and forms the backbone of New South Wales. These mountains are rich in mineral wealth.

PRINTING *the World's* HISTORY *Day by Day*



Here is a nerve center in a modern newspaper. The world's news flows to a telegraph editor in the "slot" of a U-shaped desk. He judges the stories for news value and passes them to copy readers "on the rim" of the desk for editing. After a few minutes of swift work, the copy readers send each story to be set in type, as shown on the next page.

NEWSPAPERS. The daily paper brings the news of the whole world to our doors every morning. A fresh edition may arrive at the corner newsstand every hour. The latest events appear in print and picture within minutes after they occur. But we are so accustomed to all this speed that we seldom stop to wonder how the work is done. Suppose we take a trip through a modern newspaper plant to see how the world's news is brought to us.

A good place to start is the editorial department. Here every device of modern communication is at work bringing in news; and the newspaper staff works as swiftly and efficiently as the machines. Reporters and photographers arrive on the run. Typewriters click at high speed. Telephones ring. Teletype machines print news stories from all over the world. Editors and copy readers work swiftly over copy. Boys—and in many offices, girls—dash here and there, taking copy to the typesetters. But there is no confusion. Everybody in the room, from managing editor to copy boy, knows his job and works like a smooth-running cog in a high-speed machine.

Handling Last-Minute News

In one part of the room, we may see a last-minute story being made ready for the edition. It may be a fire, an accident, or a crime. Whatever it is, reporters on the spot telephone in the news as they get it to a "rewrite" man. He has a telephone receiver clamped to his ear, and he writes the news as it comes, a few lines at a time on separate sheets of paper. A boy rushes each sheet of copy to the city editor; the editor examines it quickly and passes it to the copy desk. Here a copy reader revises or rewrites parts of the story, writes a headline, and calls a copy boy. The boy sends the story through a pneumatic tube to the composing room.

Swift Work in the Mechanical Departments

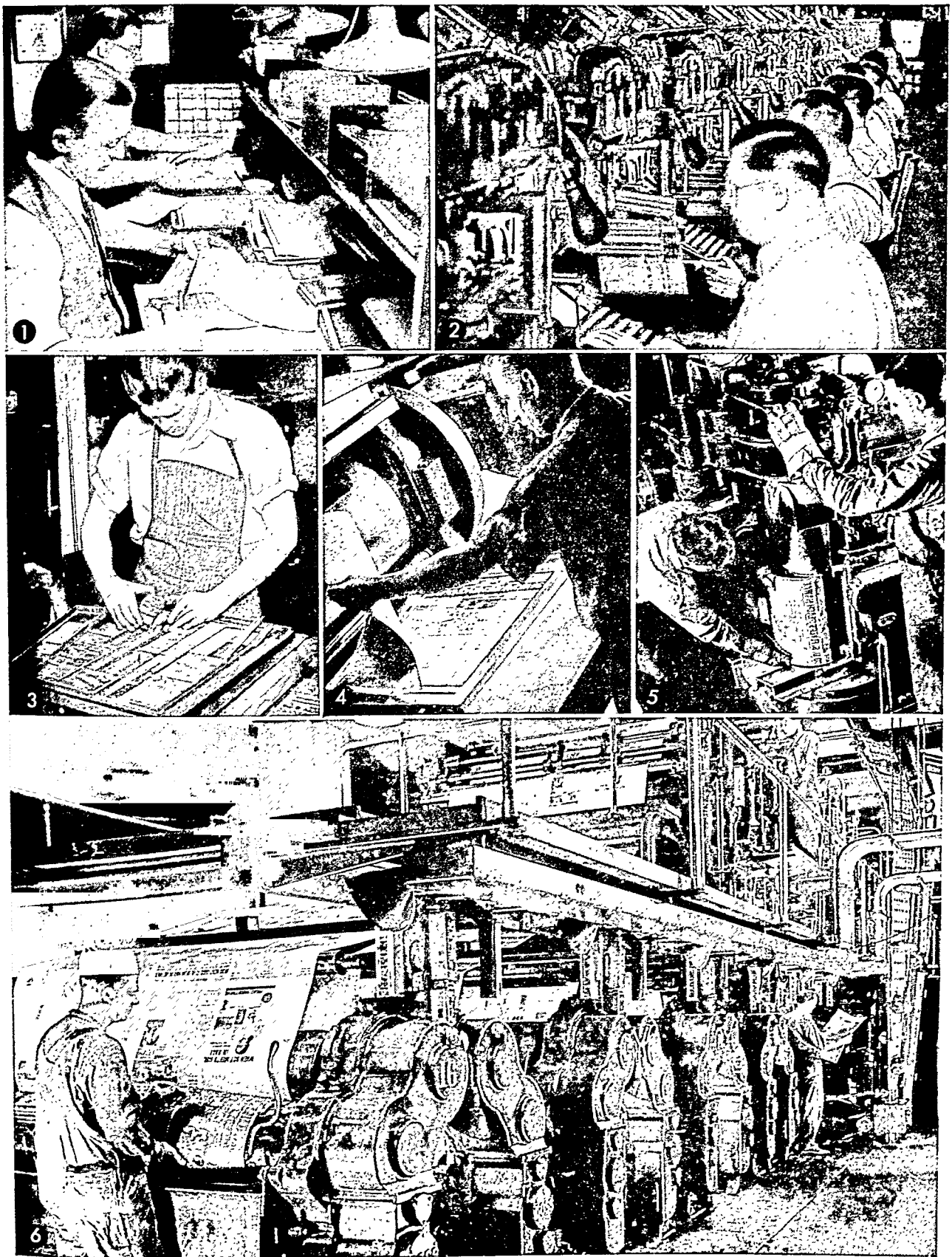
Here each story is made ready for printing with the same swift efficiency. Copy cutters divide each sheet of copy into two or more "takes," and apportion the "takes" among the operators of linotype machines (*see* Linotype). Nearly as fast as the words came from the typewriter, these machines cast them into lines of type. Proofreaders check proofs for accuracy, and the type is rushed to the forms. These are large metal frames, each one the size of a page. Make-up men arrange the type in the forms to make pages.

Meanwhile, the engraving department has been preparing engravings or "cuts" from last-minute photographs. Twenty minutes after a cameraman arrives, his pictures are developed, and prints are given to the picture editor. He marks the size of the cut he wants. Then the engravers make a half-tone from the print in less than half an hour (*see* Photoengraving). The minute the cut is ready, the make-up man sets it in place in the proper form.

At length the clocks throughout the plant point to "deadline"—the last minute when new stories can be received for the edition. Compositors rush the last stories into type; make-up men lock the last forms and send them to the stereotypers. In a matter of minutes these workers prepare curved printing plates from the type forms, as shown on the next page. Thanks to speed in all these operations, the deadline for copy is usually only about half an hour before the time the presses must start printing.

As soon as the last printing plate is in place on the press, the foreman gives a signal. Immediately

FROM COPY TO TYPE TO FINISHED NEWSPAPER



1. Copy cutters divide a news story into convenient "takes" for the typesetters. 2. Skilled operators at the linotypes quickly turn each story into type. 3. A make-up man places the type in a form, or "chase", for a page. 4. The stereotyper molds an impression of the form on a mat, or sheet of papier-mâché. 5. In this caster a printing plate has been made by pouring molten metal against the curved mat. 6. The pressman places the plate on the giant rotary printing press.

the huge mass of delicate machinery starts. At one end we see an enormous roll of white paper—five miles of it. At lightning speed the paper is fed into the press. And far too fast for the eye to count them—300,000 an hour in the most modern plants with a battery of presses—our completed newspapers, cut and folded, just as they come to us, leap forth at the other end. (*See* Printing.)

Endless belts whirl the papers out to the distributing and mailing rooms. Chugging automobiles are piled high and rush at breakneck speed to delivery stations throughout the city. Other automobiles dash to make fast mail trains for distant points, while dozens of newsboys seize their quotas and hurry to the street to shout the news of some great man's death, an important political development, or a terrible tragedy half an hour after it has happened.

Still more astonishing to the uninitiated is the device by which news that is received within the last few minutes before press time is printed in the form of brief bulletins on the first page. This device is called the "fudge-box." A space of any desired size, usually two columns wide, is left blank on the stereotype plate. Exactly corresponding to this blank space on another cylinder is an arrangement into which type can quickly be fitted and clamped in place. Suppose a baseball game is in progress. A reporter in the press box beside a telegraph operator or a telephone reports each play as it is made. Another man in the fudge room of the newspaper office repeats the plays to the operator of the fudge linotype, so that each play is recorded on the metal slugs even before the applause in the grandstand has died down. Perhaps 30 seconds before the giant press is started, the type thus set is rushed to the special fudge cylinder and clamped directly in place without the necessity of casting a plate from it. Thus it often happens that the newsboys are shouting the result of a ball game on the streets before half the crowd has left the park.

Vast Expenses of a Great Newspaper

Such speed is possible only because a modern metropolitan newspaper is one of the most efficiently organized industries in the world. Besides professional newspaper men—editors, copy readers, and reporters—masters of at least half a dozen highly skilled crafts are required in its production. The amount of money represented by a newspaper plant and the cost of production are enormous. The few cents which you pay for your copy does not pay for the white paper alone.

Three mechanical factors have made their influence most keenly felt in producing the modern newspaper. They are: (1) the development of the printing press; (2) the invention of the linotype, the monotype, and allied devices; and (3) the invention of the telephone, the telegraph, and wireless telegraphy. The first two of these factors made great speed of production and enormous volume of product possible. The third annihilated time and distance and made it possible to assemble the news of the world overnight.

Although there are many newspapers in Europe and elsewhere which "cover" the news of the world comprehensively, the dailies of the great cities of the United States undoubtedly offer the most highly developed examples of modern journalism. This is due not only to the completeness of their mechanical equipment, but also to their enterprise, engendered by keen competition, which causes them to go to any expense to score a "beat" or "scoop" on their rivals.

How New Our Newspapers Are

Nearly all the great strides in newspaper-making have come in the last hundred years. It was not such a far cry from the *Acta Diurna* ("Daily Events") of ancient Rome—short bulletins of battles, fires, elections, etc., compiled by government officials and posted up in public places—to the official *Notizie Scritte* which the government of Venice issued in the 16th century. This was a hand-written bulletin, and the written journal persisted long after the use of printing began, largely because government censors kept a close watch on printed newspapers. About the same time private presses in other cities of Europe began issuing news-letters from time to time reporting the most remarkable events of the time. In 1615 the news-letter developed into the first regular weekly newspaper, the German *Frankfurter Journal*. The first regular newspaper in England was the *Weekly Newes*, started in London in 1622. The freedom of the press from censorship before printing came first in England in 1695, and marked a great forward step in the history of newspapers. Boston was the home of the first American newspaper, *Public Occurrences* (1690), which was speedily suppressed by the governor of Massachusetts. Next came the *News-Letter* (1704) and the *Gazette* (1719), also published in Boston. In 1729 Benjamin Franklin started the weekly *Pennsylvania Gazette* at Philadelphia, later merged with the *North American*, which was for a century and a half one of the leading papers of the United States.

The First Daily Newspapers

The first *daily* newspaper in America, the *American Daily Advertiser*, was started in Philadelphia in 1784. Next came the *New York Daily Advertiser*, in 1785. During the Revolutionary War period, more than 30 papers appeared more or less regularly in various sections. The *New York Evening Post*, founded in 1801 by Alexander Hamilton, John Jay, and associates, was edited by William Cullen Bryant for nearly 50 years, from 1829 to 1878. Carl Schurz held the same post for five years.

The early newspapers set forth chiefly political and other opinions of the editors and their friends, their party, or their financial backers. Editors depended largely upon subscribers to send news. The *New York Sun*, founded in 1833, was the first newspaper to gather news systematically. James Gordon Bennett developed that policy as editor of the *New York Herald*, started in 1835. For many years the *Herald* was one of the world's best known newspapers, with a Paris edition produced in the French capital. Bennett

stressed foreign news, and introduced financial, dramatic, musical, club, and society columns into the pages of his daily paper.

Development of the telegraph and the railroad more than doubled the circulation of American newspapers between 1840 and 1850. As the frontier advanced in the west, papers sprang up in new settlements. Some of them continue today. The *Detroit Free Press* was launched in 1835; the *Chicago Tribune* in 1847; in St. Louis, the *Post-Dispatch* started in 1851 and the *Globe-Democrat* in 1852.

A Million Copies a Day

In 1875, an American newspaper with a sale of 50,000 was remarkable. In recent years, however, one New York newspaper has sold over 2,000,000 copies daily and more than 4,000,000 on Sunday. Two Chicago newspapers have each sold more than 1,000,000 copies of their Sunday editions. The average daily circulation of newspapers in the United States exceeds 50,000,000 and that of Sunday papers exceeds 40,000,000. Weekly papers circulate over 15,000,000.

The record number of 2,494 daily and 16,152 weekly publications in the United States has fallen to 1,800 dailies and 10,000 weeklies. Many of these are printed in foreign languages, especially in the great cities which have a large foreign population.

Advertising is the life-blood of a newspaper, and since advertising rates are based on circulation, there is a constant battle for circulation. In this struggle many papers have been absorbed by stronger rivals. Newspaper circulation is limited largely to certain areas, and the fewer the papers in each area, the better chance each has for more sales.

Importance of Advertising

Income of American newspapers for a typical year has exceeded $1,000,000,000. Almost three-fourths of this amount comes from advertising; and the remainder from circulation. Newspapers have large well organized advertising departments, which are ever alert to sell advertising space. Batteries of telephone operators accept "ads" by telephone, and sometimes even solicit advertising by wire. Large newspapers also maintain advertising staffs in many of the chief cities of the country and in the principal capitals of Europe.

Almost any advertising was accepted by early newspapers. Now reputable papers guard their advertising columns. Doubtful advertising is investigated and false or misleading "ads" are rejected. Many newspapers refuse to accept certain classes of "ads."

Newspaper advertising, like circulation, has territorial limits. Department store advertising is an important source of income in large cities, as are the small "classified advertising columns," such as the "help wanted," and "real estate," "ads," but these have purely a local field. National advertising of products sold all over the country appears often in many papers at the same time and is of growing importance in the newspaper field. (*See* Advertising.)

Many newspapers maintain extensive "promotional staffs" for the benefit of advertisers. Experts study a product and the prospects for its sale, and advise and sometimes even plan a campaign by which the public is to be told of the product.

How the "Chains" Work

The large capital needed for newspapers has brought the "chain" newspaper. More than 50 "chains" have controlled over 300 papers at one time. All papers of a chain use the same feature articles, such as brief articles on health, short stories, answers to questions, and humorous articles; and they also use the same cartoons, special foreign articles, and the services of one of the great news-gathering organizations, such as the Associated Press, United Press, or International News Service. Each one prints the city and state news in its territory, as well as local advertising. National advertising often is placed with a chain for insertion in several or all the papers it controls.

Financing of newspapers by issues of stock and bonds is replacing individual ownership by one man or one family. Criticism is raised whenever large commercial interests secure financial control of a paper; there is the fear that they may seek to influence public opinion unduly through propaganda, or partisan statements, published in the papers. The term "subsidized press" has been applied to papers so controlled. A paper also is said to be subsidized if it permits advertisers to dictate its editorial policies.

The Problem of Propaganda

To indicate their good faith, many newspapers state on the editorial page their "platforms," that is, the chief principles they advocate; and also place "by-lines" stating the names of writers over all articles which advance the interests of a particular cause. Some newspapers try to present both sides of controversial subjects, by printing articles supplied by advocates of the opposing views. Nearly all open their columns to letters representing all shades of opinion. Nearly all subscribe to the principle that news should be reported fairly and accurately, without "editorializing" in the news columns.

White paper is such an important item with the present tremendous circulations that some papers now own forests, paper mills, short railroad lines, and steamships, which produce and transport their paper.

In New York and Chicago, some papers in order to save time in distribution, have installed branch printing plants in distant neighborhoods or in suburbs. Matrices or plates are rushed from the main office to these plants, where the papers are printed and quickly put on the streets.

Recent Rise of the "Tabloids"

The "tabloid" or "picture-paper," usually about half the size of a regular newspaper, tries to tell most of the news with pictures. The first successful tabloid in America, started in New York in 1919, was patterned after the prosperous *London Mirror*. The popularity of "picture-papers" soon influenced even more conservative newspapers to print more pictures.

Millions of newspaper readers, old and young, eagerly follow "feature" material, such as fiction in

the form of short stories or serials, columns of household advice, fashions, chatter about persons and events, humor, personal opinion, and the popular "funnies" or comic strips. Most of these are sold by syndicates to many newspapers, which publish them on the same day, and so they are called "syndicated features." Famous writers and artists can thus be paid large salaries. Notable persons frequently contribute to this important phase of present-day journalism. Former President Coolidge, for example, wrote a series of short daily articles for publication in scores of newspapers.

Comic Strips and Cartoons

Artists of wide reputation draw daily comic strips and cartoons. The joys and the griefs, the pranks and the adventures of famous line-and-color figures, such as R. F. Outcault's "Buster Brown," "Bud" Fisher's "Mutt and Jeff," George Herriman's "Krazy Kat," Sidney Smith's "Andy Gump," and many others have delighted readers of all ages. Some editors believe that the "features" have the greatest drawing power both to secure and to hold readers.

Successful papers now provide many special services for readers as well as for advertisers. An information department may give out data of almost any sort, from information concerning schools, vacation resorts, ocean or railroad travel, to the latest reports concerning the condition of automobile roads. Many have a department to advise small investors; some maintain income tax bureaus in proper season to help the taxpayer make out his return.

The importance of the newspaper has been recognized universally. Indeed, it was called by Macaulay "the Fourth Estate"—more important, as Edmund Burke once exclaimed, pointing to the reporters' gallery in the English House of Commons, than the original "three estates," the clergy, the nobles, and the freemen. The press is usually held to be the most effective single factor in shaping public opinion.

Value of Newspaper Reading

Teachers of history and sociology emphasize the value of the regular reading of newspapers by students. They point out the importance of current news articles as helps in the study of the social, economic, and political trends of the day. Controversy has arisen regarding the good or the harm that is done by the printing of so-called "sensational" news stories, especially those that give details of crime. Editors differ widely in the extent to which they present crime news and in the way they handle such material. Some students of society hold that crime news should be almost entirely omitted, believing such publicity tends to increase crime. Most editors believe that it should receive adequate attention, so that the public may be stirred to rebel against the causes of crime or its toleration by corrupt officials.

High schools, colleges, and universities now offer courses, either in special departments or in schools of journalism, to train writers and editors. Many of these have experienced newspaper men in charge. The college-trained man and woman are sought, not only for reportorial and other editorial positions, but also for the business and advertising departments. They are now generally preferred to the unschooled "rough-and-ready" newspaper type of earlier days.

Newspaper Work as a Career

Journalism as a career has been the subject of much debate. Newspaper work undoubtedly has a lure that brings to classes in journalism many who are not suited to the work. Many students look upon newspaper work as a stepping-stone to other careers. Many authors and playwrights have started with newspapers; but it is equally true that many more have come from far different walks of life—from the law office, the store, the doctor's office, the scientist's laboratory, and the ship at sea. Many successful writers never were inside a newspaper office.

Newspaper salaries are not large, except for so-called "stars," editors, and executives. The man or woman assigned to Washington as special correspondent has about reached the top in the profession, yet the salaries of these special correspondents often do not compare with salaries of leaders in many business fields. The foreign correspondent ranks about with the Washington reporters in importance and in salary. Any such post requires first a thorough knowledge of what constitutes news, with an ability to write accurately, clearly, simply, and tersely. But tact, diplomacy, and an ability to keep on favorable terms even with those hostile to his paper are just as important. This ability is not a "gift" as is commonly believed. It may be developed, if one has a liking for writing, after stern self-disciplining in the use of the right word and the laws of effective writing. (*See* Writing.)

An increasing number of women are finding success in newspaper work. In addition to reportorial work, many have specialized in writing articles or columns on fashion, society, and on household or art topics.

The modern American newspaper is divided into five departments. They are the editorial, circulation, business, advertising, and mechanical. The principal executives are the publisher, who is usually the proprietor and editor-in-chief; the business manager; the managing editor and the advertising manager. Each department chief is responsible for the smooth and orderly working of his department, and the activities of all the departments must dovetail together with clocklike precision.

News Gathering and Editing

The editorial staff is headed by the managing editor, who is in direct charge of gathering, editing, and publishing the news. Coöperating immediately with the managing editor are the city editor, the telegraph editor, the news editor, and the make-up editor. The reporters, divided into "general assignment" men and those who cover certain "runs" such as the courts, City Hall, police station, etc., work directly under the city editor and his assistant. Everything written for the newspaper, including telegraph and local news, financial news, "feature" articles, musical and dra-

GATHERING NEWS IN FARAWAY PLACES



Newspapers and news-gathering agencies send reporters and photographers all over the world to "cover" events. 1. Here we see photographers taking pictures of the "Big Three" at the Tehran conference in November 1943. 2. The correspondent and photographer sitting before their tent on Guadalcanal Island risked their lives to get eyewitness war news. 3. Reports flash to the newspaper office on this automatic teletype printer, and pictures are also transmitted by wire or radio. 4. An hour or two after the story "breaks," the newsboy is crying its headlines.

matic items, and correspondence, must go through the hands of sub-editors, or copy readers, who prepare the copy for the printer, correct it, "trim" it to allotted space, eliminate mistakes, and write the headlines.

The telegraph editor has charge of editing all news that comes into the office over the wires. On a few of the largest newspapers a foreign editor is in charge of his own paper's foreign service and all foreign news gathered by other agencies. Several copy readers usually assist the telegraph editor, who is known commonly as "head of the telegraph desk." The makeup editor supervises the arrangement of type in forms in the composing room. With the managing editor, the news editor, and the city editor, he determines in what column and on what page each important article is to appear, and helps to decide what to "play up" and to "play down." Frequently news stories are given prominence rather because they conform to the political or business policy of a newspaper than because of their intrinsic importance or interest. Sporting news is gathered by the sporting editor and his assistants, who are usually recognized experts in various lines of sport. In like manner musical, dramatic, and financial news is written by men or women who make a specialty of these lines.

Coöperative News Bureaus

In the larger cities the newspapers usually form a coöperative bureau to cover all routine news. This is mimeographed and sent to all newspaper offices simultaneously through pneumatic tubes. So thoroughly organized is the business of gathering news that scarcely anything of importance can happen in a large city without the newspapers becoming aware of it. Trained reporters develop an uncanny "nose for news" which enables them to ferret out information despite the most strenuous efforts to conceal facts; and frequently this quality, together with a broad acquaintance, enables them to score "scoops," or exclusive stories. To achieve this the good reporter will perform prodigies of labor, sometimes at the risk of life and limb.

Most large American newspapers maintain a staff in Washington, sometimes as many as half a dozen of their best reporters. This is a coveted post; but the position the reporter prizes most is that of foreign correspondent. Some American newspapers have men stationed in all the important capitals of Europe, South and Central America, and Asia. Some have a dozen or more such bureaus, each with a "star" reporter in charge of a staff. Smaller papers obtain their national and foreign news almost entirely from the great news-gathering agencies.

In the United States are three such agencies with reporters stationed all over the world. The greatest is the Associated Press, a nonprofit coöperative association supported by the dues of the members. It began in 1848 with six newspapers; today it includes about 1,400. It has about 285,000 miles of telegraph wire in the United States. Large "A.P." offices receive more than 100,000 words daily. The United Press, formed in 1907, and the International News Service (1909) are commercial enterprises. (All these agencies also send news to papers in foreign lands.)

The British news agency is Reuter's. It began as a telegraph service for market data, but in 1858 became a general news agency in London and soon reached throughout the world. Because it was controlled by persons who were not primarily newspaper men, Reuter's was charged with coloring or suppressing news for political and financial reasons. During the second World War, however, its ownership was voluntarily turned over to an association of British newspapers.

Other Sources of News Material

An enormous amount of "copy" is sent out by newspaper syndicates. These supply a wide variety of material which small newspapers could not afford to prepare individually, such as cartoons, comic strips, fiction, household and fashion articles, and other "features." In recent years the syndicated "column" of news comment has sprung up to meet the increased interest in world affairs. Each columnist interprets the news according to his own views, and some have considerable influence on public opinion.

Another source of news is publicity material. This is information sent free by most large corporations and organizations. Even universities and government agencies issue "press releases" about their activities. Surveys have shown that as many as half the articles in some issues of newspapers have been built on publicity material. This often presents valuable information, but much of it is biased and written to promote special interests.

No other news field, perhaps, has developed so rapidly in recent years as that of pictures. Photograph syndicates have multiplied, and even small newspapers have established photographic departments. Many papers equip their reporters with cameras. Photo-transmission by radio and wire enables American newspapers to print a picture of an event on the same day that it took place in Europe or the Orient (*see* Telephotography). The photoengraving department has therefore gained in importance, and rotogravure and color presses are now indispensable to large newspapers (*see* Photoengraving and Photolithography).

The Library or "Morgue"

A little-known but valuable source of material is the newspaper's library or "morgue." Originally this was a file of material for obituary articles, but it has grown into a great reference library. Each day articles are clipped from newspapers and magazines and filed in the library as background material for future articles. Some of the larger libraries house millions of clippings, several thousand photographs, hundreds of reference books, and huge stacks of bound volumes of the newspapers.

To save library space, many newspapers are now "micro-filmed." By this process, a whole page is photographed on a film about an inch and a half long —no larger than many postage stamps. The film is read in a viewing device called a "projector."

The MAN WHO DISCOVERED *the* LAWS *that Rule the Universe*

NEWTON, SIR ISAAC (1642–1727). For ages the laws of nature were hidden from human knowledge and understanding, but in the 16th and 17th centuries they gradually began to come to light. Last of a great line of forerunners of the dawn, Galileo died in January 1642. That same year saw the birth of one greater than he, destined to shed the full light of day on the work of earlier men—Isaac Newton, who was born on Dec. 25 (old style), 1642, at Woolsthorpe, England.

To realize what Newton's discoveries mean to the world, let us look a little way into the minds of men of several centuries ago. In those days, of course, men recognized a certain order underneath nature's apparent confusion—such as the fact that the sun always rises in the east and sets in the west; that summer and winter, day and night, follow one another; that objects always fall to the ground when released in mid-air. But people merely accepted these happenings in nature without being able to explain them.



SIR ISAAC NEWTON
His Genius Gave Modern Science Its Foundations

Few in those days thought to find answers to nature's riddles by observation or experiment. At best, all that could be classified as "natural science" was a collection of far-fetched explanations and guesses. The English Royal Society had what was called a "mermaid's bone" and a "unicorn's horn," not to mention a stag beetle whose horns, worn in a ring, were said to be good for rheumatism. Natural science, as we know it today, had no place in a "liberal education" for the reason that as yet it scarcely existed. The nature of light, of heat, of sound, and of electricity were unknown; chemistry was still befogged with alchemy, and astronomy with astrology. The farthest outposts of scientific knowledge in the inorganic world were the discoveries of Galileo and Kepler in astronomy, mechanics, and optics (*see* Astronomy; Galileo; Kepler).

Such was the intellectual world into which Newton was born. He was the son of a gentleman farmer, who, dying before his only son's birth, left his widow in very moderate circumstances.

More Interested in Living Science

At school young Isaac, according to his own later accounts, was but an idler until he was aroused by the desire to outstrip a young bully who stood above him in his classes. The classical Greek and Latin education of the times must, indeed, have been deadly dull to a mind like Newton's, all alive with curiosity about the universe of nature. Not being able to find out what he wanted to know in school, the boy "tinkered around" with tools, making now a windmill, now a water clock, and now a carriage to be propelled by the occupant—not to speak of sundials and even doll furniture for little girl friends.

One science, to be sure—the science of mathematics—did form a part of "every gentleman's education," and in this Newton was a discoverer almost as soon as he was a graduate. He developed the new method of calculus (or, as he called it, "fluxions") in the year of his graduation from Trinity College, Cambridge University (1665). The method was invaluable to science, and many years later it enabled Newton to prove the law of gravitation. He had conceived the theory while still a young man. The "apple story" of how he happened to get the idea is told elsewhere (*see* Gravitation). As a serious test of his theory he calculated the orbit of the moon, and the motion as he calculated it agreed "pretty nearly" with the known facts. But "to a mind like Newton's 'pretty nearly' is as bad as 'not at all,'"

THE HUMILITY OF TRUE GREATNESS

Though Newton's contributions to science were among the greatest ever made by any one man, he had the modesty of true genius. "If I have seen farther, it is by standing on the shoulders of giants," he wrote in reply to one who complimented him on his researches. And shortly before his death he wrote, "I seem to have been only a boy playing on the seashore and diverting myself in now and then finding a smoother pebble or a prettier shell than ordinary, whilst the great Ocean of Truth lay all undiscovered before me."

and so gravitation was laid aside for the time being.

Now began the series of careful, logically conducted experiments on light and color, which were to lead to the first of his great discoveries in natural science. By 1669, the year in which he was appointed professor of mathematics in Cambridge University, Newton had demonstrated the compound character of light and the fact that color resides not in the object but in the light itself. These discoveries were not made public, however, until 1672, when Newton reported them to the Royal Society. His studies of light also led him to the invention of the reflecting telescope.

Newton's Theory of Light

Newton explained light by the "corpuscular" theory —that is, that it was caused by a stream of minute particles or "corpuscles," given off at a high velocity by a luminous body. Scientists later adopted the "undulatory wave" theory (*see* Light). But since then the discovery of radium and the manifestations of radioactivity have proved the existence of minute particles moving with the high speeds needed for Newton's corpuscular theory, and now we are not so sure that Newton was wholly wrong on this point. (*See* Radiation.)

Just when Newton began to study again the problem of gravitation is not known, but in 1684 the astronomer Edmund Halley stumbled upon the fact that the quiet Cambridge scholar had worked out in solitude the principles of the theory. At Halley's urgent desire, Newton set them forth in the great work generally called the 'Principia' (*Philosophiae Naturalis Principia Mathematica* or 'Mathematical Principles of Natural Philosophy'). It is said that there were not 12 men in Europe capable of understanding this book at its publication in 1687. It has been called the greatest single contribution to science ever made by any one man. It established the ideas of "mass" and "force," the principles of the mechanics of the heavenly bodies, and the science of theoretical mechanics as it exists today.

A Great, Gentle, Modest Soul

Far from seeking recognition for his work, Newton shrank from publicity to a degree that is almost unknown today. Controversy was distasteful to him, and the dispute with the German scientist G. W. Leibnitz over the calculus (which the two men seem to have invented independently) was the exception to a rule deliberately adopted and closely adhered to. But when James II interfered illegally with the universities, Newton took an active part in defending the University of Cambridge. Later he was elected to a seat in the Convention Parliament which seated William and Mary on the throne in place of James II. His friend Charles Montague, chancellor of the exchequer, then appointed him to a position in the mint, in 1696, and in 1699 he was made its head.

Now we may see our philosopher enjoying a modest yet ample fortune—"three lackeys to his coach and as many servants indoors." A charming and devoted niece kept his establishment running smoothly, and his income permitted him to dispense his bounty generously to needy men of science and members of his own family. In 1703 he was elected president of the Royal Society, "the highest honor in science to which an Englishman could aspire." Knighthood at the hand of good Queen Anne followed in 1705, with the prefix "Sir" to his name. So peace and prosperity were Newton's lot until his death in 1727. His ashes lie today among the great in Westminster Abbey.

A well-known story—which, however, is not certainly true—tells how one day Newton's little dog Diamond, while alone in his master's study, overturned a candle which set fire to the great scientist's papers, and destroyed the work of years. "Ah! Diamond, Diamond! Thou little knowest the mischief thou hast wrought!" is said to have been Newton's only comment. Whether true or not, the story illustrates the serenity of Newton's temper.

NEW YEAR'S DAY. When we celebrate the first day of the new year, we are following a custom that dates back to the very dawn of civilization; for nearly all peoples have observed a new year's celebration, though the time has varied widely—sometimes as early as the autumnal equinox (about September 21), sometimes as late as Midsummer's Day (June 22).

If we could travel around the world on a magic carpet and peep at the new year celebrations in the various countries, what a wonderful variety of customs we should find! If you were in China you might think that the Chinese were celebrating all their holidays for the year at once, for they close their shops for several days while they make merry with feasts and fireworks and the general exchange of gifts and good wishes. In preparation every debt must have been paid, every house swept and cleaned, and each person furnished with holiday clothes and a supply of preserved fruits, candies, and ornamental packages of tea to give to his acquaintances.

The Japanese New Year festival is perhaps even gayer. No matter how poor he may be, everyone provides himself with shining new clothes and takes three days off from work to visit his friends or entertain them at his home. Every gatepost is adorned with dark green pines and feathery light green bamboos, while over the doorways hang vivid red lobsters and crabs, and scarlet tangerine-like fruits, symbolical of long life and happiness. The streets are thronged with happy children playing battledore and shuttlecock the whole day long, and everyone beams with joy, bowing and wishing the compliments of the season even to perfect strangers.

Throughout the rest of the Orient, too, the opening of their New Year is celebrated with elaborate festivals that correspond to the Christmas celebrations of Western countries. In some European nations also, especially France and Scotland, New Year's Day is a more important holiday than Christmas. If you were a French peasant child you might put your *sabot* (wooden shoe) on the hearth for a gift at Christmas, but grown-ups in France exchange gifts at the

New Year festival. They also have family parties and exchange visits.

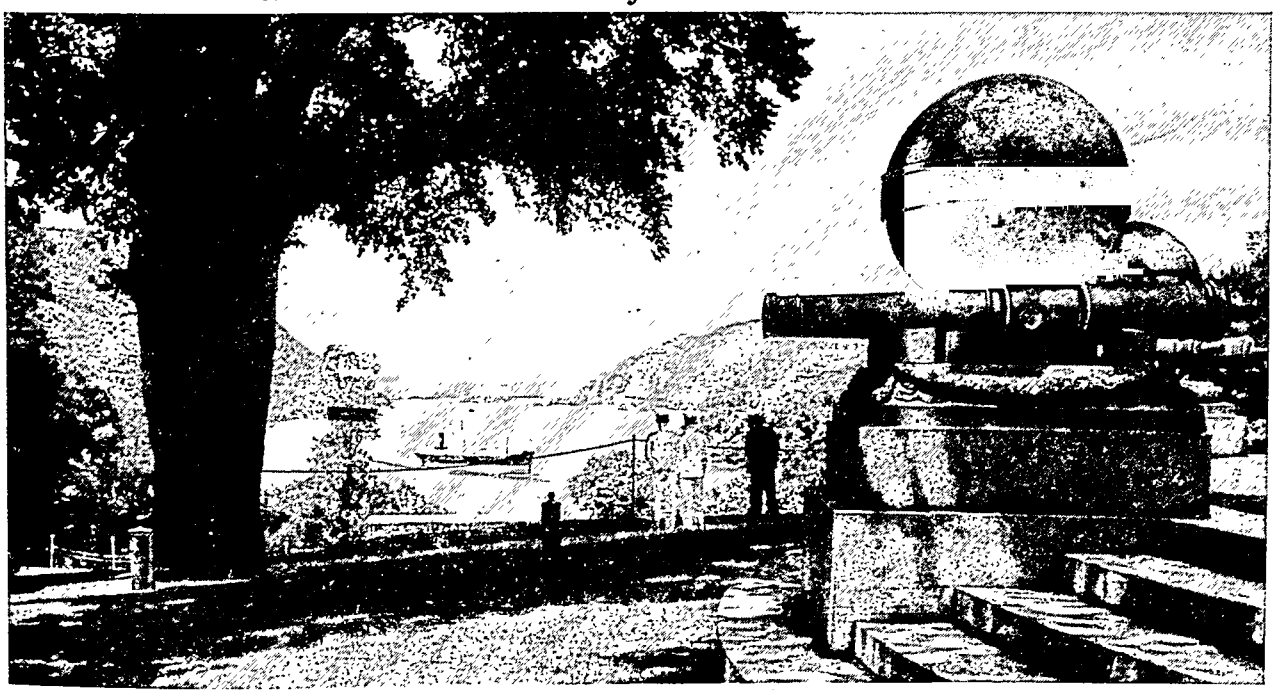
Scotland celebrates New Year's Eve with a heartiness nowhere surpassed. The tradition that to be "first-foot" in a house brings luck for the whole year sends midnight revelers into the streets of Scottish cities on New Year's Eve. Each one carries cakes and spiced ale to insure his host a bounteous year.

Some cities have special customs. Leningrad (Russia) once welcomed the new year with one hundred cannon shots fired at midnight. Some Scandinavian cities also welcome the new year with the noise of firearms; and the Yuletide celebration continues until Twelfth Night (12 days after Christmas), as in Italy.

In America the observance of New Year's Day is as varied as the character of the people. Each community has New Year's Eve "watch night" service in the churches, dancing and theater parties, and gay street revelers. New Year's Day is a time for general entertaining and visiting. But people have dropped the old custom of keeping open house and making New Year's calls.

March 25 was the usual date for beginning the new year in most Christian countries in the Middle Ages, and England retained this date until 1751. In those countries which still use the Julian calendar New Year now comes on January 13 of our reckoning (*see* Calendar). The Jewish New Year, Rosh Hashana, is called the "feast of the trumpets." It occurs in September or October and lasts 48 hours. The official Chinese New Year now coincides with that of the West.

WEALTH *and* POWER *of the* "EMPIRE STATE"



The Hudson River Presents a Scenic View from Battle Monument at West Point

NEW YORK. George Washington, traveling with Gov. George Clinton through New York, remarked that this new state might become the "seat of empire." Whether the state's popular name came from this comment is not known, but for many years New York has been called the "Empire State."

The state richly deserves this title. Although only 29th among the states in area, New York State is first in population. It has nearly 15 million residents, about 10 per cent of all the people in the United States. It also ranks first among the states in manufacturing, construction, and wholesale and retail trade.

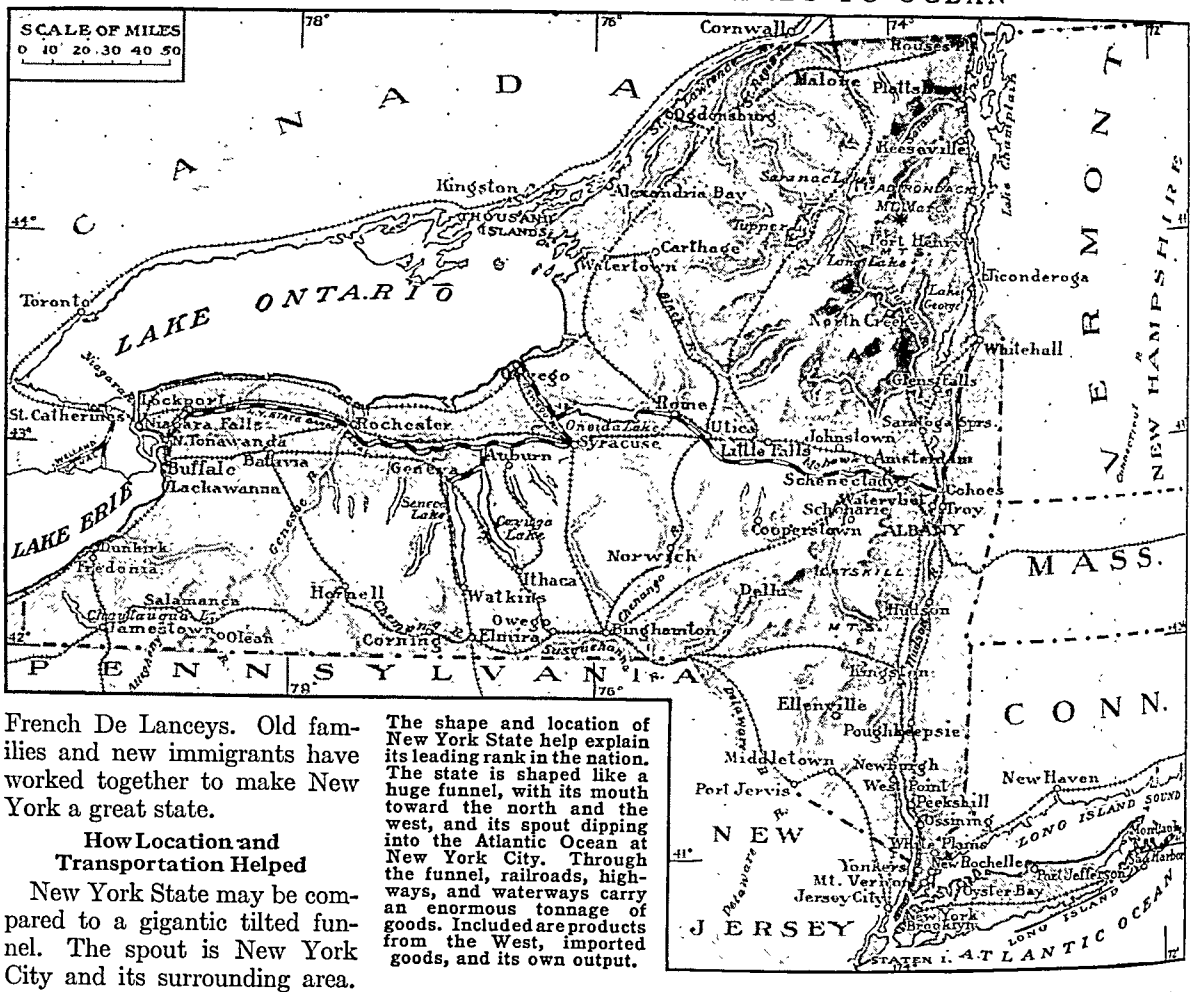
The People of New York

New York is predominantly an urban state, with about four out of five of all its residents living in cities and towns. New York City alone has nearly 8 million people, or about one-half of the state's entire population. This city, together with the two Long Island counties of Nassau and Suffolk, and Westchester County to the city's north, have about two thirds of all the people in New York State.

The population upstate is about 5,500,000. These people reside in cities and towns chiefly along or near the Hudson River and the route of the Erie Division of the New York State Barge Canal. Those in rural areas cultivate farms located principally in river valleys or gently rolling country.

For many years New York City has been the chief gateway for immigrants entering the United States. As a result New York State has a much larger foreign-born population than any other state. Its older stock includes such names as the Dutch Van Rensselaers, Roosevelts, Schuylers, and Stuyvesants, German Astors, English Clintons, Scottish Livingstons, and

THE VAST FUNNEL FROM LAKES TO OCEAN



The shape and location of New York State help explain its leading rank in the nation. The state is shaped like a huge funnel, with its mouth toward the north and the west, and its spout dipping into the Atlantic Ocean at New York City. Through the funnel, railroads, highways, and waterways carry an enormous tonnage of goods. Included are products from the West, imported goods, and its own output.

French De Lanceys. Old families and new immigrants have worked together to make New York a great state.

How Location and Transportation Helped

New York State may be compared to a gigantic tilted funnel. The spout is New York City and its surrounding area. To the northward, the spout gradually widens between Connecticut on the east and New Jersey and Pennsylvania on the southwest. The funnel then broadens tremendously. The east side borders on Massachusetts, Vermont, and Lake Champlain; the south side is Pennsylvania's northern boundary. The mouth of the funnel, from northeast to southwest, is bounded by the St. Lawrence River, Lake Ontario, the Niagara River, and Lake Erie.

The foundation of New York's prosperity was the Hudson River and the route along which the Erie Canal was built. As early as 1609 the English explorer, Henry Hudson, discovered that the river later named for him was navigable for 150 miles. In the *Half Moon* he sailed up the river to a point above the site of the present city of Albany, where the Mohawk River enters the Hudson.

Several waterfalls along its course made the Mohawk unnavigable. But its valley lay in a low gap across the Appalachian highlands and connected over a flat divide with an easily traveled route to the eastern end of Lake Erie. From there the Great Lakes gave access to the vast heart of the continent.

Throughout colonial times, the warlike Iroquois Indians held the region and were hostile to the colonists. But this obstacle was overcome when the Federal government was formed, and New York then possessed the best route between the Atlantic and the interior. Along this route the people of New York developed the Hudson River-Erie Canal waterway. Later they built great highways and main-line railroads to the West. Cities and farming areas sprang up to take advantage of the transportation facilities.

Today about 80 per cent of the residents of New York State live in the counties crossed by or bordering on the Erie Canal-Hudson River route, and in the five counties making up New York City. Other counties with sizable populations are on Long Island, on or near the Pennsylvania border, and along eastern Lake Ontario and the St. Lawrence River.

In 1782 New York withdrew its claim to land west of the Alleghenies and gave it to the Federal government. But as the nation grew, New York lost little by its act, because the rich states formed from the territory produced a brisk trade that contributed greatly to the Empire State's prosperity.

Natural Beauty of the State

New York State is noted for its beautiful mountains, lakes, and rivers. These scenic areas were formed during the Ice Age, when all the state but

Continued on page 208

New York Fact Summary



NEW YORK (N.Y.): Named for Duke of York, later James II of England. "York" derived from Middle English *Everwik*, also *Yerk*.

Nickname: "Empire State," from its great size and wealth, its important geographic position, and its variety of peoples.

Seal: Sun rising behind mountains, ship and sloop on Hudson River; all upon shield held by Liberty and Justice; spreading eagle above shield, motto below.

Motto: Excelsior (Ever Upward).

Flag: For description and illustration, *see* Flags.

Flower (unofficial): Rose. **Bird** (unofficial): Bluebird. **Tree** (unofficial): Sugar maple. **Song:** None official.

THE GOVERNMENT



Capital: Albany (since 1797).

Representation in Congress: Senate, 2; House of Representatives, 43. Electoral votes, 45.

State Legislature: Senators, 56; term, 2 years. Assemblymen, 150; term, 2 years. Convenes Wednesday after first Monday in January every year. No limit to regular or special session.

Constitution: Adopted 1894. Proposed amendment must be (a) passed by majority vote of legislature at 2 sessions (2d session following general election) and (b) ratified by a majority voting on amendment at a popular election.

Governor: Term 4 years. May succeed himself.

Other Executive Officers: Lieutenant governor, attorney general, comptroller, all elected; terms, 4 years. Secretary of state appointed by governor (with senate approval); term, same as governor.

Judiciary: Court of appeals—7 judges, elected at large; term, 14 years. Supreme court—10 districts; justices elected; term, 14 years. County courts—1 in each county, except Greater New York; judges elected; term, 6 years; in courts of Bronx, Kings, New York, Queens, Richmond counties, judges elected; term, 14 years.

County: 62 counties; government by board of supervisors, county-manager, or county-executive form.

Municipal: Mayor and council most common; some cities have commission or council-manager forms.

Voting Qualifications: Age, 21; residence in state, 1 year; in county, 4 months; in district, 30 days. Literacy test required for first voting only.



TRANSPORTATION AND COMMUNICATION

Transportation: Railroads, 7,500 miles. First railroad, Mohawk and Hudson (Albany to Schenectady), 1831. Rural roads, 79,500 miles. Airports, 243.

Communication: Periodicals, 1,799. Newspapers, 705. First newspaper, the *Gazette*, New York City, 1725. Radio stations (AM and FM), 145; first station, WJX, New York City, licensed Oct. 13, 1921. Television stations, 17; first stations, WNBT and WCBS-TV (as WCBW), New York City, both began operation July 1, 1941. Telephones, 6,499,100. Post offices, 1,905.

THE PEOPLE AND THEIR LAND

Population (1950 census): 14,830,192 (rank among 48 states—1st); urban, 85.5%; rural, 14.5%. Density: 309.3 persons per square mile (rank—5th state).

Extent: Area, 49,576 square miles, including 1,632 square miles of water surface (29th state in size; 26th if Great Lakes area of 3,627 square miles is added).

Elevation: Highest, Mount Marcy, 5,344 feet, near Keene Valley; lowest, sea level.

Temperature (°F.): Average—annual, 47°; winter, 24°; spring, 44°; summer, 68°; fall, 50°. Lowest recorded, −52° (Stillwater Reservoir, Herkimer County, Feb. 9, 1934); highest recorded, 108° (Troy, July 22, 1926).

Precipitation: Average (inches)—annual, 39; winter, 8; spring, 10; summer, 11; fall, 10. Varies from about 28 in n.e. and n.w. corners to about 48 in s.e.

Natural Features: Hilly countryside; Adirondack Mountains in north, Catskills in south. Lake Champlain forms part of border on east; Erie and Ontario on northwest. Interior lakes: Canandaigua, Cayuga, Chautauqua, George, Oneida, Seneca. Principal rivers: Hudson, Mohawk; Niagara and St. Lawrence form parts of boundaries on the west and northwest.

Land Use: Cropland, 23%; nonforested pasture, 15%; forest, 36%; other (roads, parks, game refuges, wasteland, cities, etc.), 26%.



Natural Resources: *Agricultural*—fertile soil for dairying, fruit growing, truck crops and general farming. *Industrial*—sites for manufacturing cities; water power; iron ore, stone, sand and gravel, petroleum. *Commercial*—geographic position; New York City harbor.

OCCUPATIONS AND PRODUCTS

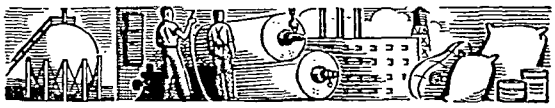
What the People Do to Earn a Living



Major Industries and Occupations, 1950

Fields of Employment	Number Employed	Percentage of Total Employed
Manufacturing	1,773,867	29.7
Wholesale and retail trade	1,240,961	20.9
Professional services (medical, legal, educational, etc.)	566,650	9.5
Transportation, communication, and other public utilities	522,237	8.8
Personal services (hotel, domestic, laundering, etc.)	387,106	6.5
Finance, insurance, and real estate	336,789	5.7
Construction	310,355	5.2
Government	270,532	4.6
Business and repair services	179,631	3.0
Agriculture, forestry, and fishery	176,148	3.0
Amusement, recreation, and related services	76,315	1.3
Mining	9,455	0.2
Workers not accounted for	94,215	1.6
Total employed	5,944,261	100.0

New York Fact Summary



What the People Produce

A. Manufactured Goods (Rank among states—1st)
Value added by manufacture* (1952), $13,101,875,000

Leading Industries in 1947 (with Principal Products)	Value Added by Manufacture	Rank among States
APPAREL AND RELATED PRODUCTS Women's and misses' outerwear; men's and boys' suits and coats; women's, children's underwear	$2,009,113,000	1
PRINTING AND PUBLISHING..... Periodicals; newspapers; commercial printing; books	1,127,727,000	1
FOOD AND KINDRED PRODUCTS .... Bakery goods; beverages; grain-mill products; confectioneries	977,329,000	2
MACHINERY (EXCEPT ELECTRICAL) Industrial machinery; office, service, and household machines	678,701,000	4
CHEMICALS AND ALLIED PRODUCTS Industrial chemicals; drugs, soap	596,038,000	2

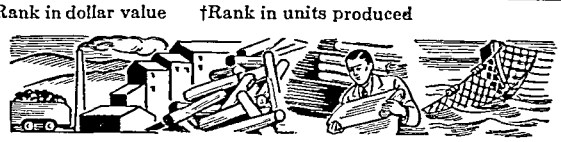
*For explanation of value added by manufacture, *see* Census.



B. Farm Products (Rank among states—13th)
Total cash income (1952), $947,325,000

Products	Amount Produced (10-Year Average)	Rank within State*	Rank among States†
Milk.....	3,688,000,000 qts.	1	3
Hay.....	5,864,000 tons	2	3
Eggs.....	174,000,000 doz.	3	10
Truck crops.....	1,146,000 tons	4	2
Cattle.....	353,633,000 lbs.	5	18
Potatoes.....	32,145,000 bu.	6	4
Corn.....	24,787,000 bu.	7	25

*Rank in dollar value †Rank in units produced



C. Fish (Rank among states—7th)
(Marine waters and coastal rivers, 1950), catch, 142,341,000 lbs.—value, $15,502,000; (Great Lakes, 1950), catch, 574,000 lbs.—value, $123,000

D. Minerals (Fuels, Metals, and Stone)
Annual value (1951), $188,256,000
Rank among states—17th

Minerals (1951)	Amount Produced	Value
Iron ore	3,650,000 tons	$39,819,000
Cement.....	13,863,000 bbls.	34,687,000
Stone.....	15,559,000 tons	24,326,000
Sand and gravel..	21,009,000 tons	19,285,000
Petroleum.....	4,254,000 bbls.	17,990,000
Salt, common....	3,519,000 tons	16,553,000

E. Trade

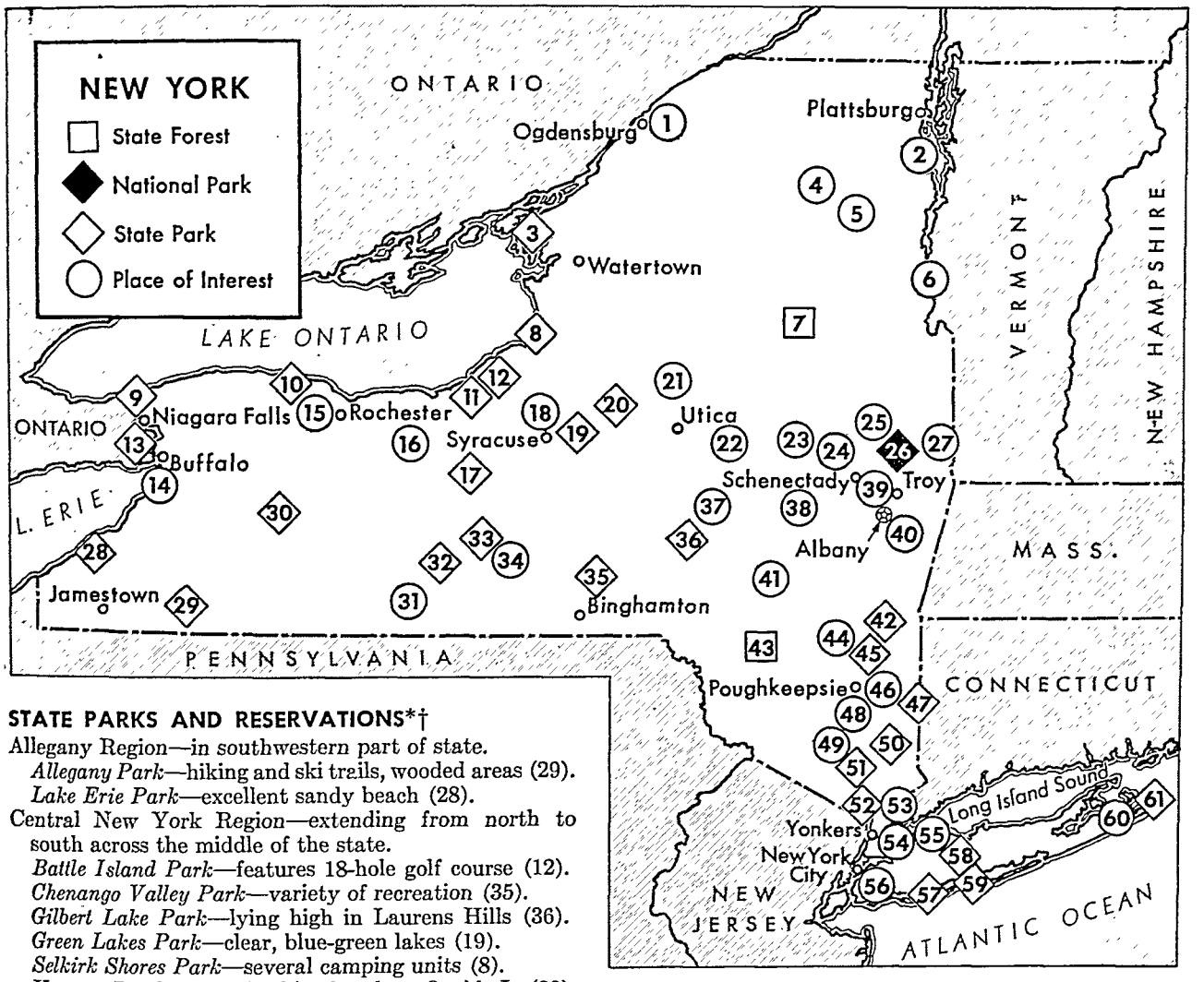
Trade (1948)	Sales	Rank among States
Wholesale.....	$43,560,734,000	1
Retail.....	14,626,526,000	1
Service.....	2,354,160,000	1

PLACES OF INTEREST*

Albany—Capitol; state bldgs.; Philip Schuyler Mansion of Revolutionary War general (1762) (*see* Albany) (39).
Ausable Chasm—Rainbow Falls at end of rocky gorge (2).
Bennington Battlefield—near Hoosick Falls; park now at site of Revolutionary War battle of Aug. 16, 1777 (27).
Bowne House—built at Flushing (N. Y. C.) in 1655; Quaker House dedicated to the freedom of worship (56).
Buffalo—monument to President McKinley in Niagara Square; Peace Bridge to Canada (*see* Buffalo) (14).
Cooperstown—James Fenimore Cooper's grave; Hall of Life Masks; Baseball's Hall of Fame (37).
Corning—Glass Center contains original imperfect 200-inch disk made for Mt. Palomar (Calif.) telescope (31).
Forest Hills—home of International Tennis Matches (56).
Fort Crailo—old fort in Rensselaer (1642); here British army surgeon supposedly wrote "Yankee Doodle" (40).
Fort Ticonderoga—historic colonial fort (1755) (6).
Fort William Henry—at Lake George; restored French and Indian War fort (1755); northeast of (25).
Guy Park—Amsterdam home of Guy Johnson, Indian agent; now Indian and colonial museum (24).
Herkimer Home—near Fort Plain; homestead of Gen. Nicholas Herkimer, Revolutionary War leader (22).
Home, Sweet Home—East Hampton birthplace of John Howard Payne, writer of song of the same name (60).
Howe Caverns—series of underground caves (38).
Hyde Park—home of Pres. F. D. Roosevelt and Vanderbilt Mansion (1898), both national historic sites (46).
Ithaca—Renwick Wildwood, bird haven; Cornell U. (34).
John Burroughs' "Ancestral Home"—at Roxbury; home of the great American naturalist (41).
Johnson Hall—scene of Indian councils; Johnstown (23).
Kingston—first state capitol (1777), now a museum (44).
Lake Placid—winter-summer sports area in Adirondacks; nearby is John Brown's Farm and Grave (5).
Mormon Monument—nr. Palmyra; where Joseph Smith dug up gold plates, source for Book of Mormon (16).
Newburgh—Hasbrouck House, George Washington's headquarters, 1782–83; historic relics (48).
New York City—Radio City, Empire State and United Nations buildings, Lever House, Federal Hall Memorial Natl. Historic Site, Castle Clinton and Statue of Liberty national monuments (*see* New York City) (56).
Niagara Falls—famous falls (*see* Niagara Falls) (13).
Old Stone Fort—Revolutionary War fort; museum (38).
Oyster Bay—Pres. T. Roosevelt's grave and home, "Sagamore Hill"; Roosevelt Memorial Park on shore (55).
Philipse Manor Hall—Yonkers; contains colonial furniture and paintings of the U.S. presidents (54).
Remington Art Memorial—Ogdensburg; paintings by Frederic Remington and other noted artists (1).
Rochester—many fine museums (*see* Rochester) (15).
Sag Harbor—whaling port of 1800's; whaling museum (60).
Saint Paul's Church Natl. Historic Site—Mount Vernon; associated with Zenger's freedom of the press trial (54).
Saranac Lake—pleasant resort city; Memorial Cottage where Robert Louis Stevenson lived 1887–88 (4).
Saratoga Springs—great spa (*see* Saratoga Springs) (25).
Steuben Memorial Park—near Remsen; replica of cabin of Baron von Steuben, drillmaster of the Revolution (21).
Syracuse—museum (salt industry) (*see* Syracuse) (18).
Tarrytown—made famous by Washington Irving (53).
Walt Whitman Birthplace—cottage nr. Huntington (55).
West Point—U.S. Military Academy on the Hudson (49).
White Plains National Battlefield Site—Revolutionary War battle fought here in 1776 (53).

*Numbers in parentheses are keyed to map.

New York Fact Summary



STATE PARKS AND RESERVATIONS*†

Allegany Region—in southwestern part of state.
Allegany Park—hiking and ski trails, wooded areas (29).
Lake Erie Park—excellent sandy beach (28).

Central New York Region—extending from north to south across the middle of the state.
Battle Island Park—features 18-hole golf course (12).
Chenango Valley Park—variety of recreation (35).
Gilbert Lake Park—lying high in Laurens Hills (36).
Green Lakes Park—clear, blue-green lakes (19).
Selkirk Shores Park—several camping units (8).
Verona Beach Park—bathing beach on Oneida L. (20).

Finger Lakes Region—surrounds six lakes, Canandaigua, Cayuga, Keuka, Owasco, Seneca, Skaneateles.
Cayuga Lake Park—sandy beach, shelter pavilion (17).
Fair Haven Beach Park—camp sites, beach (11).
Taughannock Falls Park—215-ft. falls (33).
Watkins Glen Park—200-ft. cliffs tower above stream which cascades over 19 waterfalls (32).

Genesee Region—comprising Genesee Valley and touching the shores of Lake Ontario.
Hamlin Beach Park—bathing beach on L. Ontario (10).
Letchworth Park—Genesee R. gorge known as "Grand Canyon of East"; museum of Indian history (30).

Long Island Region—stretching n.e. into the Atlantic.
Jones Beach Park—2-mile-long ocean beach; features boardwalks, refreshment pavilions, bathhouses (57). Other parks in this region are Belmont Lake (58); Bethpage (58); Fire Island (59); Heckscher (59); Hither Hills (61); Sunken Meadow (58).

Niagara Frontier Region—extending along Niagara River, the boundary between United States and Canada.
Beaver Island Park—beach, lighted boardwalk (13).
Fort Niagara Park—old French fort (1725) (9).
Niagara Reservation—magnificent falls; scenic drives through wooded Goat Island; thrilling Cave-of-the-Winds trip up to the curtain of the falls' spray (13).
Whirlpool Park—on point commanding breathtaking view of Niagara Canyon and powerful eddy below (9).

Palisades Region—known as Palisades Interstate Park, along west bank of Hudson River in New Jersey and up into New York.
Bear Mountain Park—well-equipped winter-summer sports area; 5 museums along nature trail (51).
Harriman Section—35 lakes, large game preserve (51).
Tallman Mountain Park—variety of recreation (52).

Taconic Region—extends along east banks of Hudson R.
Ogden Mills and Ruth Livingston Mills Memorial Park—old home completely furnished, now a museum (45). Other outstanding parks in the region are Baird (47); Fahnestock (50); Lake Taghkanic (42); Norrie (45).

Thousand Islands Region—along L. Ontario and St. Lawrence R. includes 13 parks—bathing, boating (3).

NATIONAL HISTORICAL PARK*

Saratoga—2,208 acres; site of British General Burgoyne's defeat by American General Gates on Oct. 17, 1777, date of the turning point of the Revolution (26).

STATE FORESTS*

Forest Preserves—Adirondack, 2,186,175 acres (7); Catskill, 234,414 acres (43); recreational forest parks.

State Forests‡—scattered throughout southern part of state and throughout Black River and St. Lawrence watersheds; units total 550,427 acres.

*Numbers in parentheses are keyed to map.
†There are 83 state parks and reservations in New York; 46 are given here.
‡The state forest units are scattered so are not located on the map.

New York Fact Summary

EDUCATION



Public Schools: Elementary, 4,197; secondary, 992. Compulsory school age, 7 through 15. The University of the State of New York, a comprehensive educational organization, supervises all schools, institutions, and libraries incorporated within the state. The Board of Regents of the University, composed of 13 members elected by joint ballot of the 2 houses of legislature, acts as legislative policy maker of State Department of Education. State commissioner of education, appointed by state regents, is executive director of state education department. Common school districts elect 1 to 3 trustees who serve 1 to 3 years. City, village, union free, and central rural boards elected except in cities where appointed by mayor. City and village supts. appointed by boards.

Private and Parochial Schools: 1,450.

Colleges and Universities (accredited): Colleges, 94; junior colleges, 19; community colleges, 10.

State-supported schools include the Veterinary College, College of Agriculture, College of Home Economics, and School of Industrial and Labor Relations, at Cornell Univ., Ithaca; College of Forestry and College of Medicine at Syracuse Univ., Syracuse; College of Ceramics, at Alfred Univ., Alfred; Maritime College, Fort Schuyler; College of Medicine, N.Y.C.; Harpur College, Endicott; 11 state teachers colleges; 6 state agricultural and technical institutes.

These state-supported higher institutions comprise the State University of New York, governed by a board of 15 trustees, appointed by the governor with the approval of the senate.

Special State Schools: For the blind—N. Y. State School, Batavia; Lavelle School and N. Y. Institute, both in New York City. For the deaf—Lexington School and St. Joseph's School in New York City; St. Mary's School, Buffalo; School for the Deaf, Rochester; Central N. Y. School, Rome; N. Y. School for the Deaf, White Plains. For Indians—6 schools in state.

Libraries: City, village, school district, and town registered public libraries, including branches, 849; county library systems, 5 (serving 9 counties); 1 regional library service center serves 3 counties. State Education Department responsible for aid in developing library service. Public library service headed by state librarian and director of Library Extension Division. School library supervision is under Division of Elementary and Secondary Education.

Noted special libraries: Grosvenor Library, Buffalo; American Merchant Marine Library Assn., Pierpont Morgan Library, New York Historical Society, New York Society Library, New York City Library (Reference Department), all in New York City.

Outstanding Museums: New York State Museum, Albany; Albright Art Gallery, Buffalo; American Museum of Natural History, Brooklyn Institute of Arts and Sciences, The Frick Collection, Metropolitan Museum of Art, Museum of the City of New York, Museum of Modern Art, New York Zoological Park, Whitney Museum of American Art, New York Historical Society, and Federal Hall Memorial, all in New York City; Museum of Arts and Sciences and George Eastman House Museum of Photography, both in Rochester; Fenimore House and Farmers Museum, Cooperstown; Fort Ticonderoga Museum, Ticonderoga; Fort William Henry, Lake George.

CORRECTIONAL AND PENAL INSTITUTIONS

Elmira Reformatory and Reception Center (for boys), both at Elmira; Westfield State Farm (reformatory for women) and Westfield State Farm (prison for women), both at Bedford Hills; New York State Vocational Institution (for boys), West Coxsackie; Woodburne Correctional Institution, Woodburne; 2 state hospitals for the criminal insane at Dannemora and Beacon (Matteawan, State Hospital); 2 state institutions for defective delinquents—Albion State Training School (for women), Albion, and Institution for Male Defective Delinquents, Napanoch; 7 state prisons—at Attica, Auburn, Dannemora (Clinton Prison), Comstock (Great Meadow Prison), Green Haven, Ossining (Sing Sing Prison), and Wallkill.

LARGEST CITIES (1950 census)

New York City (7,891,957): Boroughs: Kings (Brooklyn) (2,738,175); Manhattan (1,960,101); Queens (1,550,849); Bronx (1,451,277); Richmond (191,555). First city in the United States in population, world commerce, wholesale and retail trade, and manufacturing; clothing, printing and publishing, chemicals, and cosmetics.

Buffalo (580,132): Great Lakes port on Lake Erie; flour mills and grain elevators; steelworks and rolling mills.

Rochester (332,488): Lake Ontario port; manufactures, cameras, optical goods, precision instruments, clothing.

Syracuse (220,583): manufacturing center; typewriters; air-conditioning, electronic, and electrical equipment.

Yonkers (152,798): residential suburb of N.Y.C.; textiles, machinery, needlework, metal products.

Albany (134,995): state capital; inland port on Hudson River; paper products; meat packing; locomotives.

Utica (101,531): Mohawk Valley milling center; cotton and rayon textiles; knit goods; tools and firearms.

Schenectady (91,785): "electrical city"; electrical products, research laboratories; diesel, steam locomotives.

Niagara Falls (90,872): large tourist business; falls supply power for paper, aircraft, graphite, chemical plants.

Binghamton (80,674): photographic supplies, aviation training equipment, shoes, furniture.

Troy (72,311): N. Y. State Barge Canal terminus on Hudson River; industrial city; men's clothing, abrasives.

Mount Vernon (71,899): residential suburb of N. Y. C.; petroleum distribution; electrical devices, garments.

New Rochelle (59,725): wealthy residential suburb.

Elmira (49,716): dairy, industrial center; metal products.

Jamestown (43,354): furniture, metal products, textiles.

THE PEOPLE BUILD THEIR STATE



1524—Giovanni da Verrazano, Florentine navigator in French hire, may have sailed along New York coast and into Hudson R.

1609—Samuel de Champlain, French explorer from Quebec, enters what is now New York State near lake now named for him. Henry Hudson, sailing for Dutch in the *Half Moon*, explores river now bearing his name.

1613—Adriaen Block, Dutch explorer, establishes trading post on Manhattan Island; builds Fort Manhattan.

1614—Dutch build Fort Nassau on Castle Island (now Van Rensselaer Island) south of Albany; fort destroyed by flood, 1617; Fort Orange replaces it.

1621—Dutch West India Company chartered; given right to trade and plant colonies in America.

New York Fact Summary

1624—About 30 families of Dutch and Walloons (French Protestant refugees) come to New Netherland, form first permanent Dutch settlement in North America at Fort Orange.

1625—Dutch settlement of New Amsterdam established on Manhattan Island.

1626—Peter Minuit buys Manhattan Island from Indians for about $24 worth of trinkets.

1629—Dutch West India Company establishes patroon system (granting of estates to individuals) to encourage settlement of New Netherland.

1630—Patroonship of Rensselaerswyck established at Fort Orange; lasts into 19th century.

1638—Dutch establish first school in region at New Amsterdam.

1640—English settlers found Southold and Southampton.

1647—Peter Stuyvesant arrives in New Amsterdam May 11 to become director general of New Netherland.

1653—New Amsterdam granted burgher (borough) government; is earliest city government in U. S.

1662—Royal charter by king of England gives Connecticut colony rights to territory north of line running west from Long Island; precipitates long border dispute; settled by adjudication, 1826.

1664—English capture New Netherland; Charles II gives colony to duke of York; city and colony renamed New York; Beverwyck renamed Albany; Dutch settlers retain their lands and many privileges.

1673—Dutch temporarily recapture colony during war with England; colony restored to English by Treaty of Westminster, 1674.

1678—René Robert Cavelier, Sieur de La Salle, builds storehouse at Niagara.

1681—Pennsylvania section of Province of New York granted to William Penn.

1683—New York divided into 12 counties. Representatives of colony draw up Charter of Liberties and Privileges granting freedom of religion to Christians and giving all freeholders right to vote.

1686—Colonial Governor Dongan grants New York City and Albany city charters, July 22.

1689—Jacob Leisler, a German immigrant, leads insurrection against England; he surrenders and is hanged for treason, 1691.

1690—French and Indians destroy Schenectady in King William's War.

1693—William Bradford sets up first printing press in the colony at New York City.

1725—William Bradford publishes the *Gazette* at New York City, first newspaper in the colony.

1726—French build fort at Niagara; build fort at Crown Point, 1731.

1735—John Peter Zenger, printer of *New York Weekly Journal*, acquitted of libel charge in opposing the governor; decision promotes freedom of the press.

1741—King grants Vermont to governor of New Hampshire, precipitating long dispute over status of area.

1754—Albany Congress of provincial representatives called by British government to make treaty with Indians and to secure their support in war against France. King's College chartered by George II; reopened, 1784, as Columbia University.

1755—British fail to capture French forts at Niagara and Crown Point in French and Indian War.

1756—French capture Oswego and Fort Stanwix at site of Rome.

1757—French capture Fort William Henry on Lake George; Indians harass frontier settlements.

1759—British capture all French posts in New York.

1760—French surrender at Montreal and Indian treaty at Detroit, 1761, mark end of French and Indian wars in New York.

1765—Colonial Congress (Stamp Act Congress) meets in New York. Sons of Liberty organized.

1768—Sir William Johnson negotiates treaty with Iroquois at Fort Stanwix; they become British allies.

1770—Sons of Liberty clash with British troops in battle of Golden Hill in New York City. New York Supreme Court claims Vermont as possession of New York; Vermonters rebel against New York authorities, fighting them until 1775; Vermont sets itself up as separate state, 1777.

1775—Ethan Allen captures Fort Ticonderoga from the British, May 10; Seth Warner captures Crown Point, May 11.

1776—Provincial Congress of New York approves Declaration of Independence, July 9. British defeat Americans at battle of Valcour Island, October 11, gaining control of Lake Champlain; Howe drives Washington from Long Island and Manhattan; captures Fort Washington after battle of White Plains, October 28. Nathan Hale captured by British on Long Island, hanged as a spy.

1777—First state constitution adopted at Kingston, April 20; George Clinton, first governor, July 30; first House of Assembly meets at Kingston, September 10. British plan to seize New York State thwarted by American defense of Fort Stanwix (Schuyler) and Oriskany; Burgoyne captures Ticonderoga, July 6, but is cut off and surrenders at Saratoga, October 17; Sir Henry Clinton destroys Kingston but retreats after Burgoyne's surrender.

1778—New York signs Articles of Confederation, February 6.

1781—Defeat of British, Loyalists, and Indians at battle of Johnstown, October 25 marks end of Revolutionary War in New York; Washington makes his headquarters at Newburgh.

1783—British evacuate New York City.

1784—Bank of New York established. University of State of New York established to supervise institutions of higher education within state under Board of Regents.

1786—By Hartford Treaty, Massachusetts receives right of first purchase from Indians (pre-emptions) of lands in western New York. New York, however, wins jurisdiction over region.

1788—New York is 11th state to ratify U. S. Constitution, July 26; document is ratified despite opposition of many of state's citizens.

1789—Washington takes presidential oath in New York City, then capital of United States; capital moved to Philadelphia, 1790. Tammany Society formed. New York and Pennsylvania accept 42d parallel as their common boundary west of Delaware River. Military Tract east of Seneca Lake assigned for settlement to Revolutionary War veterans.

1790—Duncan Phyfe opens his famous cabinetmaking shop in New York City.

1791—State buys land in Delaware, Susquehanna, and Champlain valleys in the Macomb Purchase; resells land to settlers.

1792—Stock brokers of New York City agree to form New York Stock Exchange.

New York Fact Summary

1797—State capital moved, New York City to Albany.
1801—State public-school system organized.
1802—U. S. Military Academy opened at West Point.
1805—Albany-Schenectady Turnpike completed.
1806—First orphan's home in U. S. opened in New York City.
1807—Robert Fulton's steamboat, *Clermont*, makes first trip, New York to Albany; time: 32 hours. John Brinckerhoff builds nail factory at Troy.
1812—Americans fight British along New York-Canadian border in War of 1812; British burn Lewiston, Black Rock, and Buffalo, 1813; British turned back after defeat on Lake Champlain, 1814.
1816—Bellevue Hospital, one of oldest hospitals in U. S. opened in New York City.
1817—Building of Erie Canal starts; completed, 1825; funnels trade with Great Lakes and the West through New York rather than New England.
1826—Cotton mill at Troy is first in state to produce finished cotton goods. First railroad in state, Mohawk and Hudson, is chartered; begins running between Albany and Schenectady, 1831.
1827—New York abolishes slavery.
1836—Long Island Railroad begins operations.
1837—Martin Van Buren, born 1782 at Kinderhook, becomes 8th president of U. S.
1839—Abner Doubleday, tradition says, invents baseball at Cooperstown. Antirent agitation breaks out; farmers protest payments to landlords under leasehold system; such rents prohibited after 1846.
1848—First convention of leaders of American woman suffrage movement held at Seneca Falls.
1850—Millard Fillmore, born 1800 in Cayuga Co., become 13th president of U.S.
1853—New York Central Railroad Company chartered.
1858—First cablegram received in New York City from London.
1859—Peter Cooper establishes Cooper Union to provide free schooling for working men and women.
1863—Riots in New York City against draft cause temporary suspension of draft.
1874—First summer class held at Lake Chautauqua in beginning of Chautauqua Movement. Compulsory education law enacted.
1879—First hydroelectric plant built at Niagara Falls.
1883—Metropolitan Opera opened in New York City. Brooklyn Bridge completed.
1884—State Dairy Commission organized; becomes Department of Agriculture, 1893.
1886—Statue of Liberty, gift of France, dedicated on Bedloe's Island in New York Harbor.
1892—Ellis Island becomes main U.S. immigration center.
1894—Present state constitution adopted.
1898—Charter of Greater New York goes into effect, forming present New York City.
1900—Construction of New York subway begins.
1901—President William McKinley assassinated at Pan-American Exposition at Buffalo; Theodore Roosevelt, born 1858 in New York City, succeeds him; is 26th president of U.S.
1913—Woolworth Building, then highest building in world, is completed in New York City.
1918—New York Barge Canal opened.
1921—The Port of New York Authority established by treaty between New York and New Jersey.
1922—Radio station WEAF in New York City is first radio station to have commercial sponsorship of programs. State establishes children's courts.
1927—State government reorganized. Holland Tunnel opened between New York City and New Jersey.
1931—Empire State Building completed, highest in world. George Washington Bridge opened.
1932—Winter Olympic Games held at Lake Placid.
1933—Franklin D. Roosevelt, born 1882 near Hyde Park, becomes 32d president of United States.
1936—Triborough Bridge completed.
1939—La Guardia Field, New York City's airport, opens. New York World's Fair opens.
1945—Ives-Quinn Anti-Discrimination Bill becomes law.
1946—United Nations meets at Lake Success, its temporary headquarters. John D Rockefeller, Jr., gives land in New York City to United Nations for permanent site; buildings completed, 1952.
1947—James V. Forrestal, born at Beacon, becomes first U.S. secretary of defense.
1948—Idlewild International Airport opens. Religious and racial discrimination in admission to New York colleges banned.
1950—New York City threatened by drought, experiments in artificial rainmaking. Nuclear reactor of Brookhaven National Laboratory, at Upton on Long Island, begins operation.
1952—Record state budget passed, over 1 billion dollars. Keel laid for 60,000-ton *Saratoga*, sister ship of supercarrier *Forrestal*, in Brooklyn Navy Yard.
1953—President Eisenhower authorizes New York State Power Authority as U. S. agent in St. Lawrence power project with Canada. New York City celebrates its 300th anniversary.
1954—Sections of New York State Thruway completed. Congress authorizes United States to join Canada in St. Lawrence Seaway navigation project. Niagara Remedial Works Project for erosion at falls, begun.

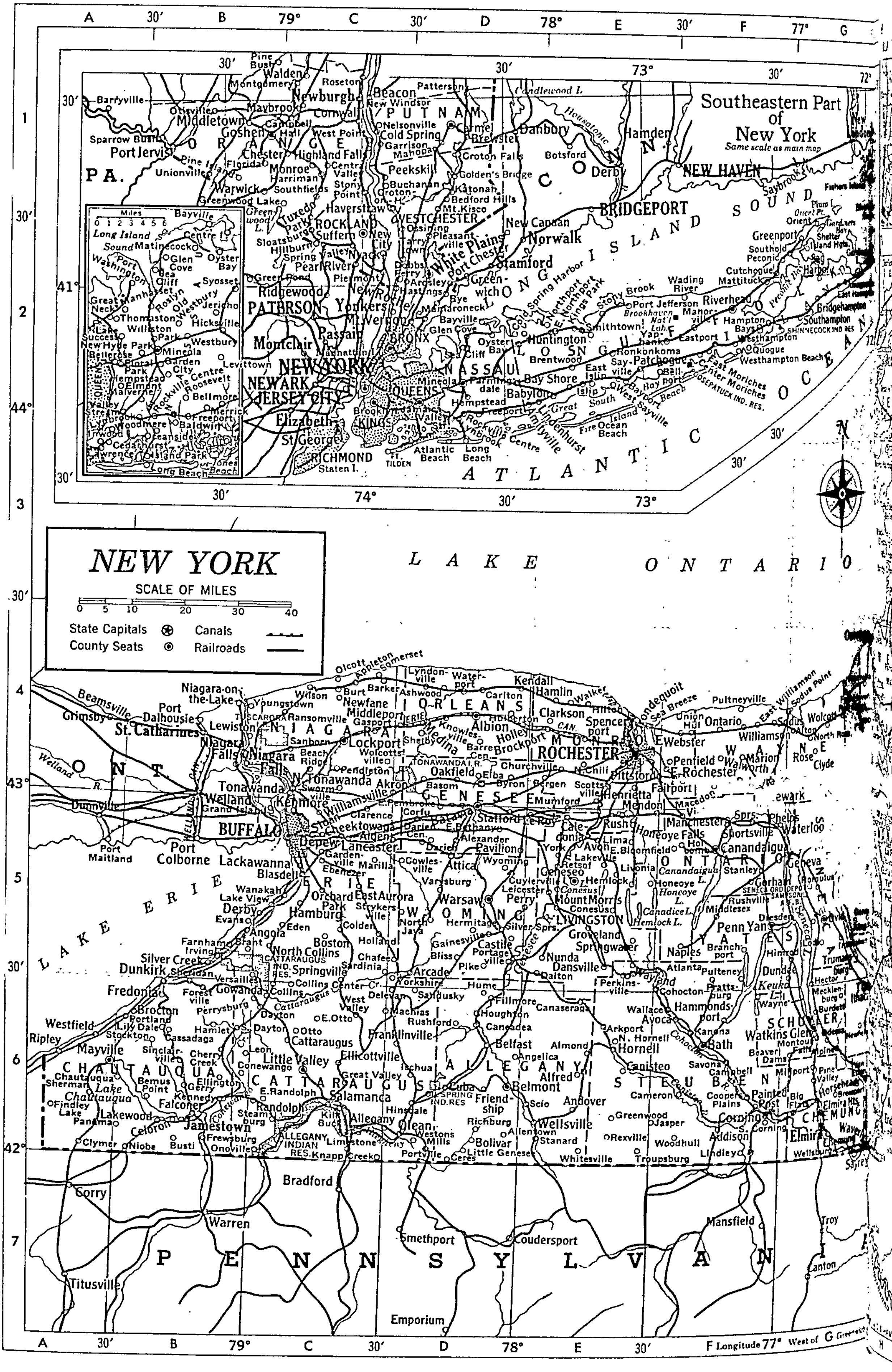
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COUNTIES																	
Albany	239,386	M 5	Cortland	37,158	H 5	Livingston	40,257	E 5	Oswego	77,181	H 4	Seneca	29,253	G 5
Allegany	43,784	D 6	Delaware	44,420	K 6	Madison	46,214	J 5	Otsego	50,763	K 5	Steuben	91,439	F 6
Bronx	1,451,277	C 2	Dutchess	136,781	N 7	Monroe	487,632	E 4	Putnam	20,307	D 1	Suffolk	276,129	F 2
Broome	184,698	J 6	Erie	899,238	C 5	Montgomery	59,594	M 5	Queens	1,550,849	D 2	Sullivan	40,731	L 7
Cattaraugus	77,901	C 6	Essex	35,086	N 2	Nassau	672,765	D 2	Rensselaer	132,607	O 5	Tioga	30,166	H 6
Cayuga	70,136	G 4	Franklin	44,830	M 1	New York	1,960,101	C 2	Richmond	191,555	C 3	Tompkins	59,122	H 6
Chautauqua	135,189	B 6	Fulton	51,021	M 4	Niagara	189,992	C 4	Rockland	89,276	C 1	Ulster	92,621	M 7
Chemung	86,827	G 6	Genesee	47,584	D 4	Oneida	222,855	J 4	Saint Lawrence	98,897	K 2	Warren	39,205	N 3
Chenango	39,138	J 6	Greene	28,745	M 6	Onondaga	341,719	H 5	Saratoga	74,869	N 4	Washington	47,144	O 4
Clinton	53,622	N 1	Hamilton	4,105	L 3	Ontario	60,172	F 5	Schenectady	142,497	M 5	Wayne	57,323	F 4
Columbia	43,182	N 6	Herkimer	61,407	L 4	Orange	152,255	C 1	Schoharie	22,703	M 5	Westchester	625,816	D 1
			Jefferson	85,521	J 2	Orleans	29,832	D 4	Schuyler	14,182	G 6	Wyoming	32,822	D 5
			Kings	2,738,175	C 3							Yates	17,615	F 5
			Lewis	22,521	K 3									

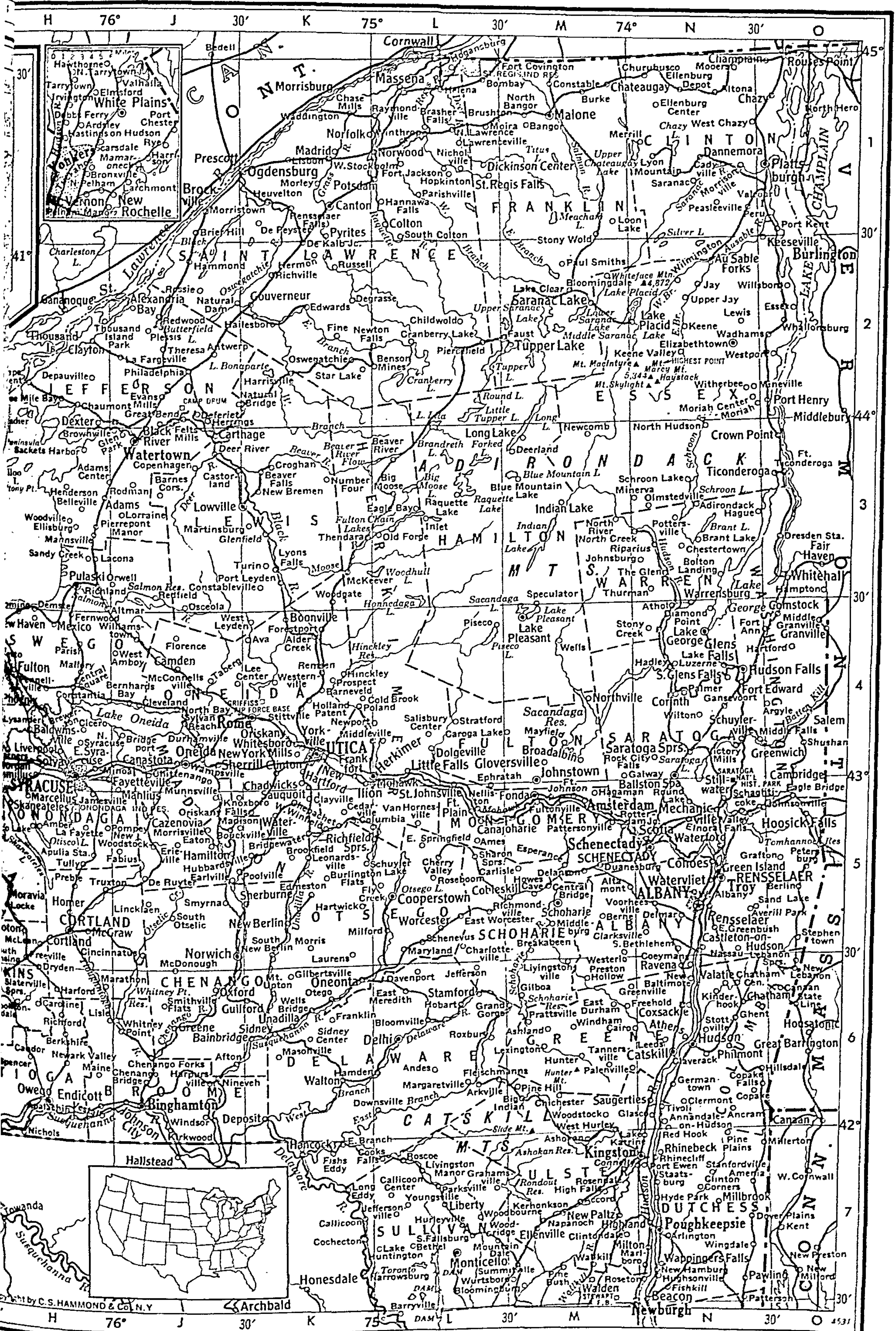
NEW YORK

CITIES AND TOWNS		
Accord	500	M 7
Adams	1,762	J 3
Adams Center	850	H 3
Addison	1,920	F 6
Adirondack	150	N 3
Afton	875	J 6
Akron	2,481	C 4
ALBANY	134,995	N 5
Albion	4,850	D 4
Alden	1,252	C 5
Alder Creek	50	K 4
Alexander	304	D 5
Alexandria Bay	1,688	J 2
Alfred	2,053	E 6
Allegany	1,738	C 6
Allentown	500	E 6
Almond	659	E 6
Alpine	194	G 6
Altamont	1,127	M 5
Altmar	299	J 3
Alton	350	G 4
Altona	500	N 1
Amagansett	1,000	G 2
Amber	130	H 5
Amenia	1,300	N 7
Ames	193	L 5
Amityville	6,164	E 3
Amsterdam	32,240	M 5
Ancram	200	N 6
Andes	430	L 6
Andover	1,351	E 6
Angelica	928	E 6
Angola	1,936	C 5
Annandale-on-Hudson	405	N 6
Antwerp	846	J 2
Apalachin	900	H 6
Appleton	100	C 4
Apulia Station	220	H 5
Arcade	1,818	D 5
Ardsley	1,744	H 1
Argyle	351	O 4
Arkport	701	E 6
Arkville	600	L 6
Arlington	5,374	N 7
Asharoken	116	*E 2
Ashland	275	M 6
Ashokan		M 7
Ashwood	110	D 4
Athens	1,545	N 6
Athol	60	N 4
Atlanta	500	F 5
Atlantic Beach	2,000	D 3
Attica	2,676	D 5
Au Sable Forks	1,643	N 2
Auburn	36,722	G 5
Aurora	711	G 5
Ava		K 4
Averill Park		O 5
Avoca	952	F 6
Avon	2,412	E 5
Babylon	6,015	D 2
Bainbridge	1,505	J 6
Baldwin	22,000	B 3
Baldwinsville	4,495	H 4
Ballston Spa	4,937	N 5
Bangor	300	M 1
Barker	523	C 4
Barnes Corners	105	J 3
Barneveld	331	K 4
Barre Center	350	D 4
Barryville	550	L 7
Basom	80	D 4
Batavia	17,799	D 5
Bath	5,416	F 6
Baxter Estates	862	*D 2
Bay Shore	9,665	E 2
Bayport	1,463	E 2
Bayville	1,981	B 2
Beach Ridge	500	C 4
Beacon	14,012	N 7
Beaver Dams	230	F 6
Beaver Falls	618	K 3
Beaver River	20	L 3
Bedford Hills		D 1
Belfast	750	D 6
Belle Terre	120	*E 2
Bellerose	1,134	A 2
Belleville	305	H 3
Bellmore	12,000	B 2
Bellport	1,449	F 2
Belmont	1,211	E 6
Bemus Point	424	B 6
Benson Mines	400	L 2
Bergen	786	E 4
Berkshire	350	H 6
Berlin	900	O 5
Berne	225	M 5
Bernhards Bay	764	J 4
Bethel	500	L 7
Big Flats	523	G 6
Big Indian	175	M 6
Big Moose	105	L 3
Binghamton	80,674	J 6
Black River	1,062	J 3
Blasdell	3,127	C 5
Bliss	678	D 5
Bloomingburg	263	L 7
Bloomingdale	476	M 2
Bloomville	350	L 6
Blue Mountain Lake	275	M 3
Bolivar	1,490	D 6
Bolton Landing	1,200	N 3
Bombay	500	M 1
Boonville	2,329	K 4
Boston	1,500	C 5
Bouckville	195	J 5
Branchport	1,000	F 5
Brant	500	B 5
Brant Lake	200	N 3
Brasher Falls	800	L 1
Breakabeen	165	M 5
Breesport	500	G 6
Brentwood	2,803	E 2
Brewerton	800	H 4
Brewster	1,810	D 1
Briarcliff Manor	2,494	*D 1
Bridgehampton		G 2
Bridgeport	1,800	J 4
Bridgewater	309	K 5
Brier Hill	200	J 1
Brightwaters	2,336	*E 2
Broadalbin	1,400	M 4
Brockport	4,748	D 4
Brocton	1,380	B 6
Bronx, The	1,451,277	D 2
Bronxville	6,778	J 1
Brookfield	400	K 5
Brooklyn	2,738,175	C 2
Brooktondale	300	H 6
Brookville	337	*D 2
Brownville	1,013	H 3
Brushton	516	L 1
Buchanan	1,820	D 1
Buffalo	580,132	B 5
Burdett	432	G 6
Burke	316	M 1
Burlington Flats	185	K 5
Burt	300	C 4
Busti	210	B 6
Byron	300	D 4
Cadyville	697	N 1
Cairo	600	M 6
Caledonia	1,683	E 5
Callicoon	800	K 7
Callicoon Center	405	L 7
Cambridge	1,692	O 4
Camden	2,407	J 4
Cameron	200	F 6
Camillus	1,225	H 4
Campbell	600	F 6
Campbell Hall	251	C 1
Canaan		O 6
Canajoharie	2,761	L 5
Canandaigua	8,332	F 5
Canaseraga	693	E 6
Canastota	4,458	J 4
Candor	802	H 6
Caneadea	400	D 6
Canisteo	2,625	E 6
Canton	4,379	K 1
Cape Vincent	812	H 2
Carlisle	200	L 5
Carlton	250	D 4
Carmel	1,526	D 1
Caroga Lake	325	L 4
Caroline	35	H 6
Carthage	4,420	J 3
Cassadaga	676	B 6
Castile	1,072	D 5
Castleton-on-Hudson	1,751	N 5
Castorland	308	J 3
Cato	431	G 4
Catskill	5,392	N 6
Cattaraugus	1,190	C 6
Cayuga	534	G 5
Cayuga Heights	1,131	*G 5
Cazenovia	1,946	J 5
Cedarhurst	6,051	B 3
Cedarville	149	K 5
Celoron	1,555	B 6
Center Moriches	1,761	F 2
Central Bridge	500	M 5
Central Square	665	H 4
Central Valley	1,300	C 1
Centre Island	199	B 2
Ceres	350	D 6
Chadwicks	2,500	K 4
Chafee	350	C 5
Champlain	1,505	N 1
Charlotteville	200	L 5
Chase Mills	250	K 1
Chateaugay	1,234	N 1
Chatham	2,304	N 6
Chatham Center	378	N 6
Chaumont	513	H 2
Chautauqua	500	A 6
Chazy	600	N 1
Cheektowaga	20,000	C 5
Chemung	400	G 6
Chenango Bridge	2,500	J 6
Chenango Forks	400	J 6
Chepachet	84	K 5
Cherry Creek	631	B 6
Cherry Valley	760	L 5
Chester	1,215	B 1
Chestertown	350	N 3
Chichester	225	M 6
Childwold	200	L 2
Chittenango	1,307	J 4
Churchville	755	E 4
Churubusco	200	N 1
Cicero	1,000	H 4
Cincinnatus	900	H 5
Clarence	1,018	C 5
Clarkson	382	E 4
Clarksville	600	M 5
Claverack	500	N 6
Clayton	1,981	H 2
Clayville	719	K 5
Clermont	500	N 6
Cleveland	555	J 4
Clifton Springs	1,838	F 4
Clinton	1,630	K 4
Clinton Corners	300	N 7
Clintondale	800	M 7
Clyde	2,492	G 4
Clymer	500	A 6
Cobleskill	3,208	L 5
Cochecton	150	K 7
Coeymans	1,250	N 6
Cohocton	943	F 5
Cohoes	21,272	N 5
Cold Brook	342	L 4
Cold Spring	1,788	C 1
Cold Spring Harbor	1,500	E 2
Colden	700	C 5
Collins	500	C 6
Collins Center	450	C 6
Colonie	2,068	*N 5
Colton	250	L 1
Comstock	2,250	O 4
Conesus	200	E 5
Conewango		C 6
Connelly	350	M 7
Constable	200	M 1
Constableville	378	J 3
Constantia	1,250	H 4
Cooks Falls	200	K 7
Coopers Plains	304	F 6
Cooperstown	2,727	L 5
Copake	600	N 6
Copake Falls		N 6
Copenhagen	690	J 3
Corfu	542	D 5
Corinth	3,161	N 4
Corning	17,684	F 6
Cornwall	2,211	C 1
Cornwall on the Hudson	2,200	C 1
Cortland	18,152	H 5
Cove Neck	200	*D 2
Cowlesville	232	D 5
Coxsackie	2,722	N 6
Cranberry Lake	232	L 2
Croghan	772	K 3
Croton Falls	1,000	D 1
Croton-on-Hudson	4,837	C 1
Crown Point	800	N 3
Cuba	1,783	D 6
Cutchogue	1,500	F 2
Cuylerville	350	E 5
Dalton	500	E 5
Dannemora	4,122	N 1
Dansville	5,253	E 5
Darien	90	D 5
Darien Center	303	D 5
Davenport	250	L 6
Dayton	300	C 6
De Kalb Junction	500	K 2
De Peyster	200	K 1
De Ruyter	561	J 5
Deer River	166	J 3
Deerland	40	M 3
Deferiet	616	J 2
Degrasse	250	L 2
Delanson	430	M 5
Delevan	611	D 6
Delhi	2,223	L 6
Delmar		N 5
Demster	200	H 3
Depauville	350	H 2
Depew	7,217	C 5
Deposit	2,016	K 6
Derby		B 5
Dering Harbor	4	*G 2
Dexter	1,038	H 2
Diamond Point	278	N 4
Dickinson Center	200	M 1
Dobbs Ferry	6,268	H 1
Dolgeville	3,204	L 4
Dover Plains	800	O 7
Downsville	720	L 6
Dresden	373	F 5
Dresden Station	76	O 3
Dryden	976	H 6
Duanesburg	287	M 5
Dundee	1,165	F 5
Dunkirk	18,007	B 5
Durhamville	700	J 4
Eagle Bay	150	L 3
Eagle Bridge		O 5
Earlville	945	J 5
East Aurora	5,962	C 5
East Bethany	150	D 5
East Bloomfield	425	E 5
East Branch	300	K 7
East Durham	300	M 6
East Greenbush	1,100	N 5
East Hampton	1,737	G 2
East Hills	2,547	*D 2
East Islip	2,834	E 2
East Meredith	132	L 6
East Moriches	1,500	F 2
East Northport	3,842	E 2
East Otto	742	C 6
East Pembroke	650	D 5
East Randolph	628	C 6
East Rochester	7,022	F 4
East Rockaway	7,970	*D 2
East Springfield	350	L 5
East Syracuse	4,766	H 4
East Williamson	300	F 4
East Williston	1,734	*D 2
East Worcester	456	L 5
Eastport	600	F 2
Eaton	250	J 5
Ebenezer	4,300	C 5
Eden	1,394	C 5
Edmeston	500	K 5
Edwards	584	K 2
Elba	569	D 4
Elbridge	586	*H 4
Elizabethtown	665	N 2
Ellenburg Center	350	N 1
Ellenburg Depot	400	N 1
Ellenville	4,225	M 7
Ellicottville	1,073	C 6
Ellington	925	B 6
Ellisburg	285	H 3
Elmira	49,716	G 6
Elmira Heights	5,009	G 6
Elmont	21,125	B 2
Elmsford	3,147	J 1
Elnora	100	N 5
Endicott	20,050	H 6
Ephratah	250	L 4
Erieville	300	J 5
Esperance	322	M 5
Essex	525	O 2
Evans		B 5
Evans Mills	518	J 2
Fabius	369	J 5
Fair Haven	628	G 4
Fairport	5,267	F 4
Falconer	3,292	B 6
Farmingdale	4,492	D 2
Farnham	396	B 5
Faust		M 2
Fayetteville	2,624	J 4
Felts Mills	300	J 3
Fernwood	200	H 4
Fillmore	527	D 6
Findley Lake	500	A 6
Fine	350	K 2
Fishers Island	536	G 1
Fishkill	841	N 7
Fishs Eddy	300	K 7
Fleischmanns	469	L 6
Floral Park	14,582	A 2
Florence	75	J 4
Florida	1,376	B 1
Flower Hill	1,948	*D 2
Fly Creek	350	K 5
Fonda	1,026	M 5
Forestport	730	K 4
Forestville	786	B 6
Fort Ann	463	N 4
Fort Covington	891	M 1
Fort Edward	3,797	O 4
Fort Jackson	138	L 1
Fort Johnson	930	M 5
Fort Plain	2,935	L 5
Fort Ticonderoga	46	O 3
Frankfort	3,844	K 4
Franklin	558	K 6
Franklinville	2,092	D 6
Fredonia	7,095	B 6
Freehold	300	N 6
Freeport	24,680	B 3
Freeville	373	H 5
Frewsburg	1,383	B 6
Friendship	1,344	D 6
Fulton	13,922	H 4
Fultonville	840	M 5
Gainesville	314	D 5
Galway	188	N 4
Gansevoort	300	N 4
Garden City	14,486	B 2
Gardenville	4,000	C 5
Garrison	1,600	C 1
Gasport	880	C 4
Geneseo	2,838	E 5
Geneva	17,144	G 5
Genoa		G 5
Germantown		N 6
Gerry	475	B 6
Ghent	600	N 6
Gilbertsville	456	K 6
Gilboa	125	M 6
Glasco	1,300	M 6
Glen Cove	15,130	B 2
Glen Park	516	J 3
Glenfield	450	K 3
Glens Falls	19,610	N 4
Gloversville	23,634	M 4
Golden's Bridge	800	D 1
Gorham	650	F 5
Goshen	3,311	B 1
Gouverneur	4,916	K 2
Gowanda	3,289	B 6
Grafton		N 5
Grahamsville	450	L 7
Grand Gorge	500	L 6
Grand Island		B 5
Grand View-on-Hudson	302	*C 2
Granville	2,826	O 4
Great Bend	500	J 2
Great Neck	7,759	A 2
Great Neck Estates	2,464	A 2
Great Neck Plaza	4,246	A 2
Great Valley		C 6
Green Island	4,016	N 5
Greene	1,628	J 6
Greenport	3,028	F 1
Greenville	376	N 6
Greenwich	2,212	O 4
Greenwood	700	E 6
Greenwood Lake	819	B 1
Groton	2,150	H 5
Groveland	500	E 5
Guilford	557	J 6
Hadley	500	N 4
Hagaman	1,114	M 5
Hague	400	N 3
Hallesboro	268	K 2
Hamburg	6,938	C 5
Hamden	250	K 6
Hamilton	3,507	J 5
Hamlet	100	B 6
Hamlin	400	E 4
Hammond	329	J 2
Hammondsport	1,190	F 6
Hampton	150	O 3
Hampton Bays	1,269	F 2
Hancock	1,560	K 7
Hannawa Falls	245	L 1
Hannibal	501	G 4
Harford		H 6
Harpursville	520	J 6
Harriman	676	C 1
Harrison		J 1
Harrisville	868	K 2
Hartford	150	O 4
Hartwick	625	K 5
Hastings on Hudson	7,565	J 1
Haverstraw	5,818	C 1
Hawthorne		H 1
Head of the Harbor	334	*E 2
Hector	65	G 5
Helena		L 1
Hemlock	400	E 5
Hempstead	29,135	A 2
Henderson	260	H 3
Henrietta		E 4
Herkimer	9,400	L 4
Hermitage	100	D 5
Hermon	547	K 2
Herrings	192	J 2
Heuvelton	712	K 1
Hewlett Bay Park	466	*D 2
Hewlett Harbor	411	*D 2
Hewlett Neck	369	*D 2
Hicksville	13,000	B 2
High Falls	1,000	M 7
Highland	3,035	M 7
Highland Falls	3,930	C 1
Hillburn	1,212	C 2
Hillsdale	400	O 6
Hilton	1,036	E 4
Himrod	225	G 5
Hinckley	198	K 4
Hinsdale	350	D 6
Hobart	618	L 6
Hogansburg	300	L 1
Holcomb	313	F 5
Holland	980	C 5
Holland Patent	400	K 4
Holley	1,551	D 4
Homer	3,244	H 5
Honeoye	200	F 5
Honeoye Falls	1,460	F 5
Hoosick Falls	4,297	O 5
Hopkinton	300	L 1
Hornell	15,049	E 6
Horseheads	3,606	G 6
Houghton	500	D 6
Howes Cave		M 5
Hubbardsville	300	J 5
Hudson	11,629	N 6
Hudson Falls	7,236	O 4
Hughsonville	250	N 7
Hulberton	500	D 4
Hume	250	D 5
Hunter	526	M 6
Huntington	9,324	E 2
Huntington Bay	585	*E 2
Hurleyville	800	L 7
Hyde Park	1,059	N 7
Ilion	9,363	K 5
Indian Lake		M 3
Inlet	250	L 3
Interlaken	770	G 5
Inwood	9,200	A 3
Ira	100	G 4
Irondequoit	34,417	E 4
Irving	350	B 5
Irvington	3,657	H 1
Ischua	170	D 6
Island Park	2,031	B 3
Islip	5,254	E 2
Ithaca	29,257	G 6
Jamaica	100,000	D 2
Jamestown	43,354	B 6
Jamesville	1,200	H 5
Jasper	600	F 6
Jay	425	N 2
Jefferson	300	L 6
Jeffersonville	450	L 7
Jericho	500	B 2
Johnsburg	200	M 3
Johnson City	19,249	J 6
Johnsonville	520	O 5
Johnstown	10,923	M 4
Jordan	1,295	H 4
Kanona	400	F 6
Katonah		D 1
Keene	550	N 2
Keene Valley	1,000	N 2
Keeseville	1,977	O 2
Kendall	325	E 4
Kenmore	20,066	C 5
Kennedy	508	B 6
Kensington	978	*D 2
Kerhonkson	1,000	M 7
Kill Buck	304	C 6
Kinderhook	853	N 6
King Ferry	400	G 5
Kings Park	10,960	E 2
Kings Point	2,445	*D 2
Kingston	28,817	M 7
Kirkwood	343	J 6
Knapp Creek	215	C 6
Knowlesville	300	D 4
Knoxboro	315	J 5
La Fargeville	425	J 2
La Fayette	260	H 5
Lackawanna	27,658	B 5
Lacona	540	J 3
Lake Clear	250	M 2
Lake George	1,005	N 4
Lake Huntington	300	L 7
Lake Katrine	750	M 7
Lake Luzerne	750	N 4
Lake Placid	2,999	N 2
Lake Pleasant	200	M 4
Lake Success	1,264	A 2
Lake View	2,400	B 5
Lakeville	384	E 5
Lakewood	3,013	B 6
Lancaster	8,665	C 5
Larchmont	6,330	J 1
Lattingtown	745	*D 2
Laurel Hollow	169	*D 2
Laurens	261	K 5
Lawrence	4,681	A 3
Lawrenceville	236	L 1
Le Roy	4,721	E 5
Lebanon Springs	520	O 6
Lee Center		K 4
Leeds	750	N 6

*No room on map for name.



NEW YORK
SCALE OF MILES
0 5 10 20 30 40
State Capitals
County Seats
Canals
Railroads
Southeastern Part of New York
Same scale as main map
LAKE ONTARIO
LAKE ERIE
ATLANTIC OCEAN
LONG ISLAND SOUND
PENNSYLVANIA
ONT.
PA.
PUTNAM
ORANGE
ROCKLAND
WESTCHESTER
NASSAU
SUFFOLK
BRONX
QUEENS
KINGS
RICHMOND
NEW YORK
NEWARK
JERSEY CITY
PATERSON
BRIDGEPORT
NEW HAVEN
Stamford
Norwalk
White Plains
Yonkers
Newburgh
Middletown
Port Jervis
Danbury
ORLEANS
NIAGARA
MONROE
GENESEE
WAYNE
ERIE
WYOMING
LIVINGSTON
ONTARIO
YATES
STEUBEN
CHEMUNG
CHAUTAUQUA
CATTARAUGUS
ALLEGANY
ROCHESTER
BUFFALO
Niagara Falls
Lockport
Batavia
Jamestown
Dunkirk
Olean
Salamanca
Hornell
Corning
Elmira
Bath
Canandaigua
Geneva
Warsaw
Geneseo
Albion
Mayville
Belmont
Lackawanna
Tonawanda
St. Catharines
Welland
Port Colborne
Bradford
Warren
Corry
Titusville
Smethport
Coudersport
Mansfield
Emporium
Longitude 77° West of Greenwich



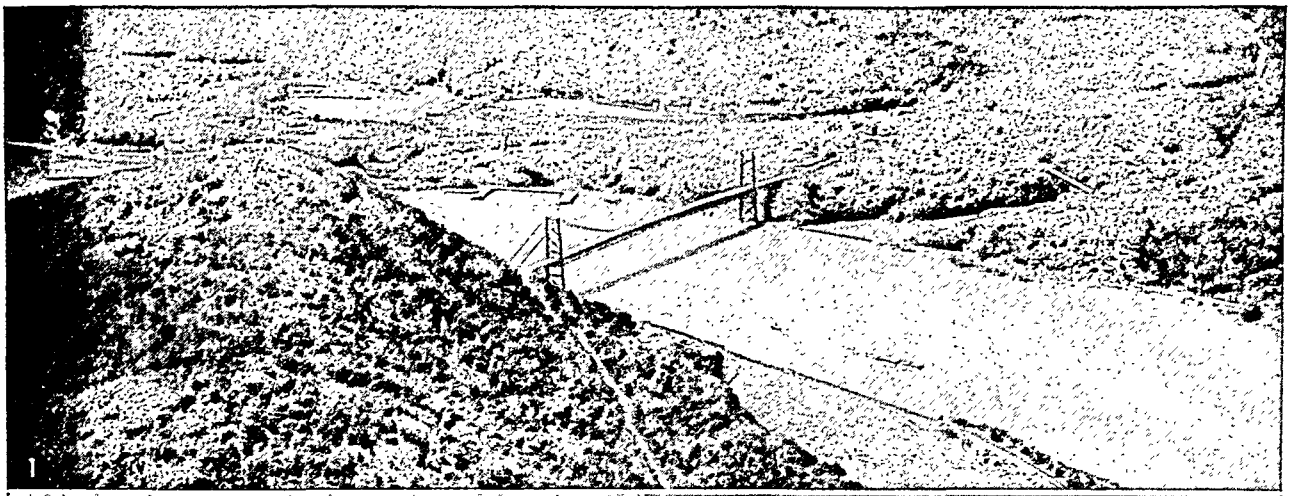
H
76°
J
30′
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74°
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1
2
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7
CANADA
ONT.
Cornwall
Morrisburg
Prescott
Brockville
Gananoque
Massena
Malone
Chateaugay
Champlain
Rouses Point
Plattsburgh
Ogdensburg
Potsdam
Canton
Norwood
Madrid
Norfolk
Dannemora
CLINTON
FRANKLIN
SAINT LAWRENCE
St. Lawrence R.
Thousand Islands
Clayton
Alexandria Bay
Gouverneur
Saranac Lake
Tupper Lake
Lake Placid
Keene Valley
Mt. Marcy 5,344
Elizabethtown
Port Henry
Burlington
Keeseville
Au Sable Forks
Lake Champlain
ESSEX
JEFFERSON
Watertown
Carthage
Lowville
LEWIS
ADIRONDACK
HAMILTON
MTS.
Old Forge
Long Lake
Blue Mountain Lake
Indian Lake
North Creek
Schroon Lake
Ticonderoga
Crown Point
WARREN
Warrensburg
Lake George
Glens Falls
Hudson Falls
Whitehall
Fort Edward
Saratoga Sprs.
SARATOGA
OSWEGO
Fulton
Pulaski
ONEIDA
Rome
UTICA
Oneida
Boonville
Camden
Herkimer
Little Falls
Ilion
Gloversville
Johnstown
FULTON
Amsterdam
MONTGOMERY
Schenectady
SCHENECTADY
ALBANY
Troy
Cohoes
RENSSELAER
Rensselaer
Hoosick Falls
SYRACUSE
ONONDAGA
Skaneateles
Cazenovia
Hamilton
MADISON
Norwich
CHENANGO
CORTLAND
Cortland
OTSEGO
Cooperstown
Oneonta
SCHOHARIE
Cobleskill
GREENE
Catskill
Hudson
COLUMBIA
DELAWARE
Delhi
Walton
Sidney
Binghamton
BROOME
TIOGA
Owego
Endicott
Johnson City
Deposit
Hancock
CATSKILL MTS.
Kingston
ULSTER
New Paltz
SULLIVAN
Monticello
Ellenville
Liberty
Port Jervis
Poughkeepsie
DUTCHESS
Newburgh
Beacon
Honesdale
Hallstead
Archbald
Towanda
Susquehanna R.
Great Barrington
MASS.
CONN.
VERMONT
White Plains
Yonkers
New Rochelle
Mt. Vernon
Port Chester
Tarrytown
Rye
...ht by C.S. HAMMOND & Co. N.Y

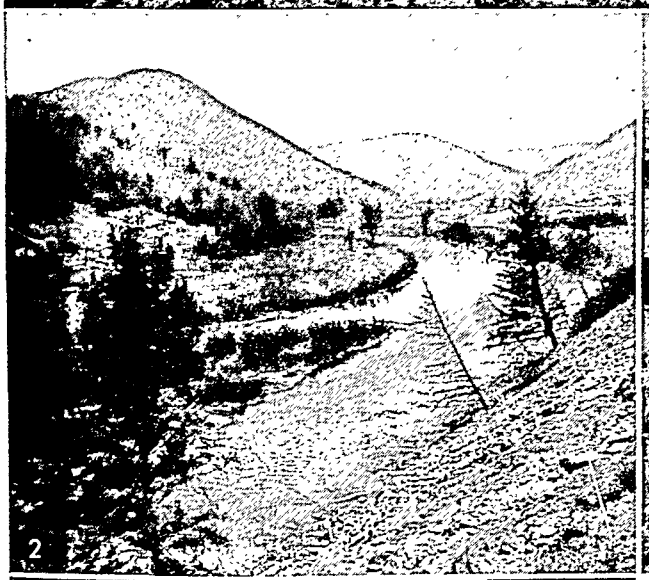
NEW YORK — *Continued*

Leicester	364	D 5
Leon	740	C 6
Leonardsville	500	K 5
Levittown	40,000	B 2
Lewis	350	N 2
Lewiston	1,626	B 4
Lexington	500	M 6
Liberty	4,658	L 7
Lily Dale	275	B 6
Lima	1,147	E 5
Limestone	601	C 6
Lincklaen	110	J 5
Lindenhurst	8,644	E 2
Lindley	250	F 6
Lisbon	300	K 1
Lisle	221	H 6
Little Falls	9,541	L 4
Little Genesee	300	D 6
Little Valley	1,287	C 6
Liverpool	2,933	H 4
Livingston Manor		L 7
Livingstonville	80	M 6
Livonia	837	E 5
Lloyd Harbor	945	*D 2
Locke	275	H 5
Lockport	25,133	C 4
Lodi	362	G 5
Long Beach	15,586	B 3
Long Eddy	350	K 7
Long Lake	1,000	L 3
Loon Lake	100	N 1
Lorraine	250	J 3
Lowville	3,671	J 3
Lycoming	200	H 3
Lynbrook	17,314	A 3
Lyndonville	777	D 4
Lyon Mountain	1,053	N 1
Lyons	4,217	G 4
Lyons Falls	864	K 3
Lysander	250	H 4
Macedon	614	F 4
Machias	850	D 6
Madison	335	J 5
Madrid		K 1
Mahopac		D 1
Maine	600	H 6
Mallory	150	H 4
Malone	9,501	M 1
Malverne	8,086	A 2
Mamaroneck	15,016	J 1
Manchester	1,262	F 5
Manhasset	20,000	B 2
Manhattan	1,960,101	C 2
Manlius	1,742	J 5
Mannsville	378	H 3
Manorhaven	1,819	*D 2
Manorville	900	F 2
Marathon	1,057	J 6
Marcellus	1,382	H 5
Margaretville	905	L 6
Marilla	350	C 5
Marion	800	F 4
Marlboro	1,709	M 7
Martinsburg	343	J 3
Maryland	300	L 5
Masonville	370	K 6
Massapequa Park	2,334	*D 2
Massena	13,137	L 1
Matinecock	507	B 2
Mattituck	1,089	F 2
Maybrook	1,316	B 1
Mayfield	761	M 4
Mayville	1,492	A 6
McConnellsville	300	J 4
McDonough	179	J 5
McGraw	1,197	H 5
McKeever	55	K 3
McLean	250	H 5
Mechanicville	7,385	N 5
Mecklenburg	300	G 6
Medina	6,179	D 4
Menands	2,453	*N 5
Mendon	327	E 4
Meridian	334	G 4
Merrill	200	N 1
Mexico	1,398	H 4
Middle Falls	500	O 4
Middle Granville	800	O 4
Middleburg	1,298	M 5
Middleport	1,641	C 4
Middlesex	300	F 5
Middletown	22,586	B 1
Middleville	647	K 4
Milford	502	K 5
Mill Neck	505	*D 2
Millbrook	1,568	N 7
Millerton	1,048	O 7
Millport	362	G 6
Milton		M 7
Mineola	14,831	B 2
Minerva	364	N 3
Minetto		H 4
Mineville	996	O 2
Minoa	1,008	J 4
Mohawk	3,196	L 4
Moira	750	M 1
Monroe	1,753	C 1
Montauk	700	G 2
Montgomery	1,063	B 1
Monticello	4,223	L 7
Montour Falls	1,457	G 6
Mooers	496	N 1
Moravia	1,480	H 5
Moriah	700	N 2
Moriah Center	400	N 2
Morley	226	K 1
Morris	641	K 5
Morrisonville	600	N 1
Morristown	546	J 1
Morrisville	1,250	J 5
Mount Kisco	5,907	D 1
Mount Morris	3,450	E 5
Mount Upton	400	K 6
Mount Vernon	71,899	H 1
Mountain Dale	700	L 7
Mumford	687	E 4
Munnsville	412	J 4
Munsey Park	2,048	*D 2
Muttontown	382	*D 2
Napanoch	1,094	M 7
Naples	1,141	F 5
Narrowsburg	614	L 7
Nassau	952	N 5
Natural Bridge	600	K 2
Natural Dam	200	J 2
Nelliston	693	L 5
Nelsonville	522	C 1
New Baltimore	550	N 6
New Berlin	1,178	K 5
New Bremen	150	K 3
New City	962	C 2
New Hamburg	350	N 7
New Hartford	1,947	K 4
New Haven	800	H 4
New Hyde Park	7,349	A 2
New Lebanon		O 6
New Paltz	2,285	M 7
New Rochelle	59,725	J 1
New Windsor	2,754	C 1
New Woodstock	500	J 5
New York (5 Boroughs)	7,891,957	C 2
New York Mills	3,366	K 4
Newark	10,295	G 4
Newark Valley	1,027	H 6
Newburgh	31,956	C 1
Newcomb	425	M 3
Newfane	1,578	C 4
Newfield	500	G 6
Newport	752	K 4
Newton Falls	700	K 2
Niagara Falls	90,872	C 4
Nichols	578	H 6
Nicholville	300	L 1
Nineveh	182	J 6
Niobe		B 6
Nissequogue	219	*E 2
Norfolk	1,252	K 1
North Bangor	500	M 1
North Bay	500	J 4
North Chili	1,000	E 4
North Collins	1,325	C 5
North Creek	942	M 3
North Haven	153	*F 1
North Hills	330	*D 2
North Hornell	605	E 6
North Hudson	250	N 3
North Java	500	D 5
North Lawrence	500	L 1
North Pelham	5,046	H 1
North River	253	M 3
North Rose	708	G 4
North Syracuse	3,356	H 4
North Tarrytown	8,740	H 1
North Tonawanda	24,731	C 4
Northport	3,859	E 2
Northville	1,114	M 4
Norwich	8,816	J 5
Norwood	1,995	L 1
Number Four	50	K 3
Nunda	1,224	E 5
Nyack	5,889	C 2
Oakfield	1,781	D 4
Ocean Beach	73	E 2
Oceanside	15,000	B 3
Odessa	526	G 6
Ogdensburg	16,166	K 1
Olcott	875	C 4
Old Brookville	644	*D 2
Old Field	238	*E 2
Old Forge	900	L 3
Old Westbury	1,160	B 2
Olean	22,884	D 6
Olmstedville	300	N 3
Oneida	11,325	J 4
Oneida Castle	596	*J 4
Oneonta	13,564	K 6
Onoville	400	B 6
Ontario	800	F 4
Orchard Park	2,054	C 5
Orient	500	G 1
Oriskany	1,346	K 4
Oriskany Falls	893	J 5
Orwell	425	J 3
Osceola	241	J 3
Ossining	16,098	D 1
Oswegatchie	500	K 2
Oswego	22,647	G 4
Otego	699	K 6
Otisco Lake		H 5
Otisville	911	B 1
Otto	350	C 6
Ovid	646	G 5
Owasco	300	G 5
Owego	5,350	H 6
Oxford	1,811	J 6
Oyster Bay	5,215	B 2
Oyster Bay Cove	561	*D 2
Painted Post	2,405	F 6
Palatine Bridge	592	*L 5
Palenville	350	M 6
Palmer	800	N 4
Palmyra	3,034	F 4
Panama	456	A 6
Parish	574	H 4
Parishville	450	L 1
Parksville	400	L 7
Patchogue	7,361	E 2
Patterson	400	D 1
Pattersonville	259	M 5
Paul Smiths	375	M 2
Pavilion	615	D 5
Pawling	1,430	N 7
Pearl River		C 2
Peasleeville	200	N 1
Peconic	850	F 2
Peekskill	17,731	D 1
Pelham	1,843	*H 1
Pelham Manor	5,306	H 1
Pendleton		C 4
Penfield	1,013	F 4
Penn Yan	5,481	F 5
Pennellville	250	H 4
Perkinsville	421	E 5
Perry	4,533	D 5
Perrysburg	361	B 6
Peru	1,000	N 1
Petersburg	550	O 5
Phelps	1,650	F 5
Philadelphia	870	J 2
Philmont	1,792	N 6
Phoenix	1,917	H 4
Piercefield	240	L 2
Piermont	1,897	C 2
Pierrepont Manor	200	J 3
Pike	286	D 5
Pine Bush	1,100	B 1
Pine Hill	233	M 6
Pine Island	500	B 1
Pine Plains	698	N 7
Pine Valley	230	G 6
Piseco	105	L 4
Pittsford	1,668	E 4
Plandome	1,102	*D 2
Plandome Heights	882	*D 2
Plandome Manor	323	*D 2
Plattsburgh	17,738	O 1
Pleasantville	4,861	D 2
Plessis		J 2
Poland	511	L 4
Pompey	225	J 5
Poolville	200	K 5
Poquott	136	*E 2
Port Byron	1,013	G 4
Port Chester	23,970	J 1
Port Dickinson	2,199	*J 6
Port Ewen	1,885	N 7
Port Henry	1,831	O 2
Port Jefferson	3,296	E 2
Port Jervis	9,372	A 1
Port Kent	175	O 1
Port Leyden	841	K 3
Port Washington	15,000	A 2
Port Washington North	650	*D 2
Portageville	350	D 5
Portland	700	B 6
Portville	1,151	D 6
Potsdam	7,491	K 1
Pottersville	400	N 3
Poughkeepsie	41,023	N 7
Prattsburg	653	F 5
Prattsville		M 6
Preble	250	H 5
Preston Hollow	200	M 6
Prospect	318	K 4
Pulaski	2,033	H 3
Pulteney		F 5
Pultneyville	225	F 4
Pyrites	240	K 1
Queens	1,550,849	D 2
Quogue	625	F 2
Randolph	1,455	C 6
Ransomville	800	C 4
Raquette Lake	200	L 3
Ravena	2,006	N 6
Raymondville	500	L 1
Red Creek	617	G 4
Red Hook	1,225	N 7
Redfield	500	J 3
Redwood	550	J 2
Remsen	483	K 4
Rensselaer	10,856	N 5
Rensselaer Falls	323	K 1
Retsof	500	E 5
Rexville		E 6
Rhinebeck	1,923	N 7
Rhinecliff	600	N 7
Richburg	514	D 6
Richfield Springs	1,534	K 5
Richford	275	H 6
Richland	450	H 3
Richmond	191,555	C 3
Richmondville	709	M 5
Richville	254	K 2
Riparius	100	M 3
Ripley	1,229	A 6
Riverhead	4,892	F 2
Riverside	818	*F 6
Rochester	332,488	E 4
Rock City Falls	300	M 4
Rockville Centre	22,362	B 2
Rodman	250	J 3
Rome	41,682	J 4
Romulus	250	G 5
Ronkonkoma	1,334	E 2
Roosevelt	10,500	B 2
Roscoe		L 7
Rose	400	G 4
Roseboom	115	L 5
Rosendale	883	M 7
Roseton	350	C 1
Roslyn	1,612	B 2
Roslyn Estates	612	*B 2
Roslyn Harbor	402	*B 2
Rossie	150	J 2
Rotterdam Jct.	850	N 5
Round Lake	876	N 5
Rouses Point	2,001	O 1
Roxbury	600	L 6
Rush	500	E 5
Rushford	900	D 6
Rushville	465	F 5
Russell	500	K 2
Russell Gardens	912	*D 2
Rye	11,721	J 1
Sackets Harbor	1,247	H 3
Saddle Rock	33	*D 2
Sag Harbor	2,373	G 2
Saint George	4,900	C 3
Saint Johnsville	2,210	L 5
Saint Regis Falls	850	M 1
Salamanca	8,861	C 6
Salem	1,067	O 4
Salisbury Center	300	L 4
Saltaire	21	*E 3
Sanborn	600	C 4
Sand Lake	1,300	O 5
Sands Point	860	*D 2
Sandusky	275	D 6
Sandy Creek	708	H 3
Saranac	750	N 1
Saranac Lake	6,913	M 2
Saratoga Springs	15,473	N 4
Sardinia	485	C 5
Saugerties	3,907	M 6
Sauquoit	1,227	K 5
Savannah	582	G 4
Savona	869	F 6
Sayville	4,251	E 2
Scarsdale	13,156	J 1
Schaghticoke	687	N 5
Schenectady	91,785	M 5
Schenevus	568	L 5
Schoharie	1,059	M 5
Schroon Lake	575	N 3
Schuyler Lake	300	L 5
Schuylerville	1,314	N 4
Scio	640	E 6
Scotia	7,812	N 5
Scottsville	1,025	E 4
Sea Breeze	25	F 4
Sea Cliff	4,868	B 2
Seneca Falls	6,634	G 5
Sharon Springs	361	L 5
Shelby	200	D 4
Shelter Island Hts.	600	G 1
Sherburne	1,604	K 5
Sheridan	1,050	B 5
Sherman	861	A 6
Sherrill	2,236	K 4
Shoreham	90	*E 2
Shortsville	1,314	F 5
Shushan	325	O 4
Sidney	4,815	K 6
Sidney Center	400	K 6
Silver Creek	3,068	B 5
Silver Springs	830	E 5
Sinclairville	672	B 6
Skaneateles	2,331	H 5
Skaneateles Falls	590	G 5
Slaterville Springs	350	H 6
Sloan	4,698	C 5
Sloatsburg	2,018	C 2
Smithtown	1,424	E 2
Smithville Flats	200	J 6
Smyrna	269	J 5
Sodus	1,588	G 4
Sodus Point	680	G 4
Solvay	7,868	H 4
Somerset	249	D 4
South Bethlehem	300	N 5
South Colton	500	L 1
South Columbia	325	L 5
South Corning	880	F 6
South Dayton	727	C 6
South Fallsburg	1,147	L 7
South Floral Park	572	*D 2
South Glens Falls	3,645	N 4
South Lansing	400	H 5
South New Berlin		K 5
South Nyack	3,102	*C 2
South Otselic	612	J 5
Southampton	4,042	G 2
Southfields	500	C 1
Southold	1,027	F 2
Sparrow Bush	650	A 1
Speculator	370	M 3
Spencer	694	H 6
Spencerport	1,595	E 4
Spring Valley	4,500	C 2
Springville	3,322	C 5
Springwater	445	E 5
Staatsburg	500	N 7
Stafford	256	D 5
Stamford	1,162	L 6
Stanard	600	E 6
Stanfordville	500	N 7
Stanley	300	F 5
Star Lake	700	K 2
Stamburg	225	C 6
Stephentown	250	O 5
Stewart Manor	1,879	*D 2
Stillwater	1,276	N 5
Stittville	375	K 4
Stockton	400	B 6
Stony Brook		E 2
Stony Creek	465	M 4
Stony Point	1,438	C 1
Stony Wold	300	M 2
Stottville	1,020	N 6
Stratford	500	L 4
Strykersville	400	C 5
Suffern	4,010	C 2
Summitville	300	L 7
Swormville	300	C 4
Sylvan Beach	600	J 4
Syosset	1,133	B 2
Syracuse	220,583	H 4
Taberg	500	J 4
Tannersville	639	M 6
Tarrytown	8,851	H 1
The Glen		N 3
Thendara	200	K 3
Theresa	925	J 2
Thomaston	2,045	B 2
Thousand Island Park	300	J 2
Three Mile Bay	350	H 2
Thurman	112	M 3
Ticonderoga	3,517	N 3
Tivoli	753	N 6
Tonawanda	14,617	B 4
Trenton (Barneveld)	331	*K 4
Troupsburg	250	F 6
Troy	72,311	N 5
Trumansburg	1,479	G 5
Truxton	425	H 5
Tuckahoe	5,991	H 1
Tully	744	H 5
Tupper Lake	5,441	M 2
Turin	273	K 3
Tuxedo Park		C 1
Unadilla	1,317	K 6
Union Hill	436	F 4
Union Springs	957	G 5
Unionville	454	B 1
Upper Brookville	469	*D 2
Upper Jay	175	N 2
Upper Nyack	1,195	*C 2
Utica	101,531	K 4
Valatie	1,225	N 6
Valhalla		J 1
Valley Falls	555	N 5
Valley Stream	26,854	A 2
Van Etten	504	G 6
Van Hornesville	200	L 5
Varysburg	350	D 5
Vernon	754	*J 4
Versailles	192	B 6
Vestal	5,000	H 6
Victor	1,066	F 5
Victory Mills	488	N 4
Village of the Branch	163	*E 2
Voorheesville	895	M 5
Waddington	819	K 1
Wadhams	175	N 2
Wading River	700	F 2
Walden	4,559	B 1
Walker	250	E 4
Wallace	300	E 6
Wallkill	1,145	M 7
Walton	3,947	K 6
Walworth	500	F 4
Wampsville	379	J 4
Wanakah		C 5
Wappingers Falls	3,490	N 7
Warners	500	H 4
Warrensburg	2,358	N 3
Warsaw	3,713	D 5
Warwick	2,674	B 1
Washingtonville	823	*B 1
Waterford	2,968	N 5
Waterloo	4,438	G 5
Watertown	217	D 4
Waterport	34,350	J 3
Watervliet	1,634	K 5
Waterville	15,197	N 5
Watkins Glen	3,052	G 6
Waverly	6,037	G 6
Wayland	1,834	E 5
Wayne	195	F 6
Webster	1,773	F 4
Weedsport	1,558	G 4
Wells	720	M 4
Wells Bridge	200	K 6
Wellsburg	638	G 6
Wellsville	6,402	E 6
West Albany	4,000	N 5
West Amboy	60	J 4
West Carthage	2,000	*J 3
West Chazy	500	N 1
West Haverstraw	3,099	*C 1
West Hurley	1,000	M 6
West Leyden	400	J 4
West Point	5,000	C 1
West Sayville	1,370	E 2
West Stockholm	305	K 1
West Valley	500	C 6
West Winfield	832	K 5
Westbury	7,112	B 2
Westerlo	250	M 6
Westernville	500	K 4
Westfield	3,663	A 6
Westhampton	950	F 2
Westhampton Beach	1,087	F 2
Westons Mills	733	D 6
Westport	200	N 2
Whallonsburg	43,466	O 2
White Plains	4,457	J 1
Whitehall	3,902	O 3
Whitesboro	750	K 4
Whitesville	883	E 6
Whitney Point	500	J 6
Willard	1,520	G 5
Williamson	250	F 4
Williamstown	4,649	J 4
Williamsville	7,605	C 6
Williston Park	830	B 2
Willsboro	500	N 2
Wilmington	962	O 2
Wilson	200	C 4
Wilton	660	N 4
Windham	822	M 6
Windsor	1,300	J 6
Wingdale	950	N 7
Winthrop	1,388	L 1
Witherbee	1,516	N 2
Wolcott	450	G 4
Wolcottsville	1,600	M 7
Woodbourne	125	K 3
Woodgate	332	F 6
Woodhull	745	B 3
Woodmere	951	L 7
Woodridge		M 6
Woodsburgh (Woodmere)	745	B 3
Woodstock	1,500	M 6
Woodville	115	H 3
Worcester	1,000	L 5
Wurtsboro	628	L 7
Wyoming	508	D 5
Yaphank	1,200	F 2
Yonkers	152,798	H 1
York	400	K 4
Yorkshire	3,528	K 4
Yorkville	932	G 4
Youngstown		L 7
Youngsville		

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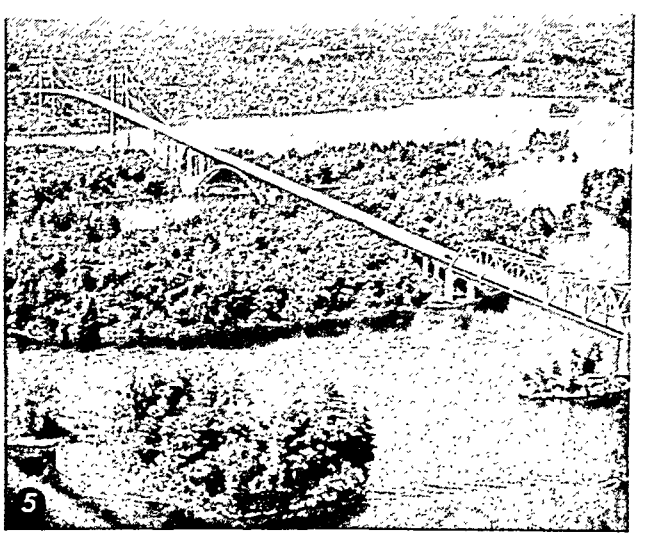
VARIED BEAUTY OF MOUNTAIN, LAKE, AND RIVER





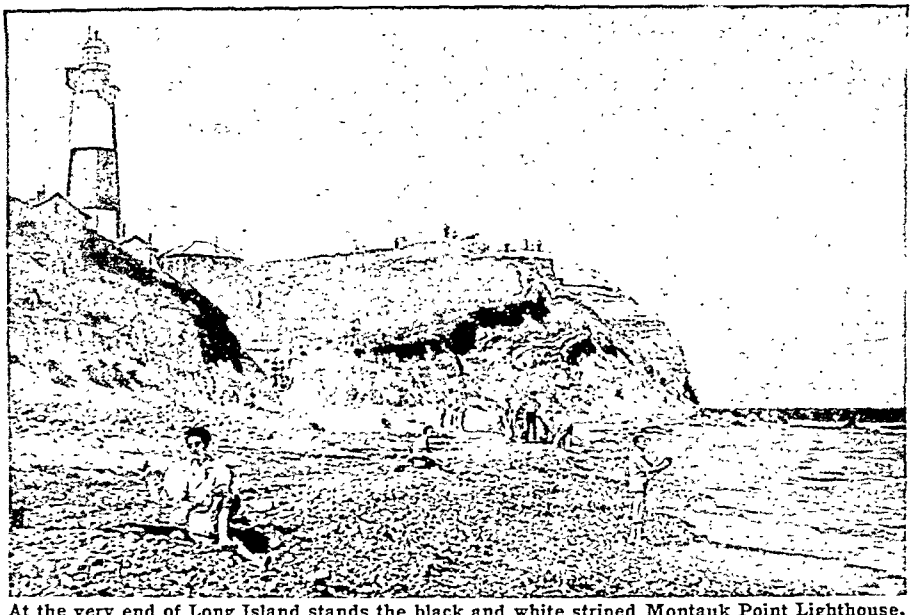






1. Bear Mountain Bridge crosses the Hudson River between rocky, wooded heights. In the foreground, on the east side, rises Anthony's Nose. On the west shore are the slopes of Bear Mountain. 2. A scene in the Catskill Mountains, along the West Branch of the Delaware River, in the southeastern part of the state. 3. Lake Placid, in the northeast, lies in the beautiful Adirondack Mountains. 4. Portage Falls on the Genesee River, in western New York, drops 110 feet. 5. The International Bridge between New York and Ontario, steps across some of the Thousand Islands in the St. Lawrence River.

AT THE EASTERN TIP OF THE EMPIRE STATE



At the very end of Long Island stands the black and white striped Montauk Point Lighthouse, built in 1796. The waves of the Atlantic have washed away more than half of the land that originally separated it from the ocean. Commercial fishermen go out for tuna and swordfish off the Point. The area back of the lighthouse is a state park.

the two westernmost counties was covered by deep glaciers, which lay over hills and valleys alike.

The glaciers widened and deepened the valleys, rounded off the hills, changed the courses of many streams, and carved out the bottoms of numerous lakes that are scattered over the state's area. The glacier action also helped make the many different soils found throughout the state. The land along the Atlantic coast subsided slightly, forming the excellent New York harbor and its islands, and the protected waterway of Long Island Sound, now a fine ship channel between New York City and New England.

The highest part of New York State is the Adirondack Mountain region in the north. From these mountains, streams flow east into Lake Champlain; south into the Hudson River and its east-flowing tributary, the Mohawk River; and north into the St. Lawrence River. The Adirondack area is outstanding for its beautiful mountains, valleys, rivers, and lakes. Located there is Mount Marcy, 5,344 feet in elevation, the highest peak in the state. Best known among the scores of lakes in this region are Lake Placid, a year-round resort and winter sports center, and Saranac Lake, a health resort noted for the treatment of tuberculosis. To the east of the Adirondacks is Lake Champlain; to the southeast is Lake George. Both lakes are popular for their summer vacation spots and for their historic sites.

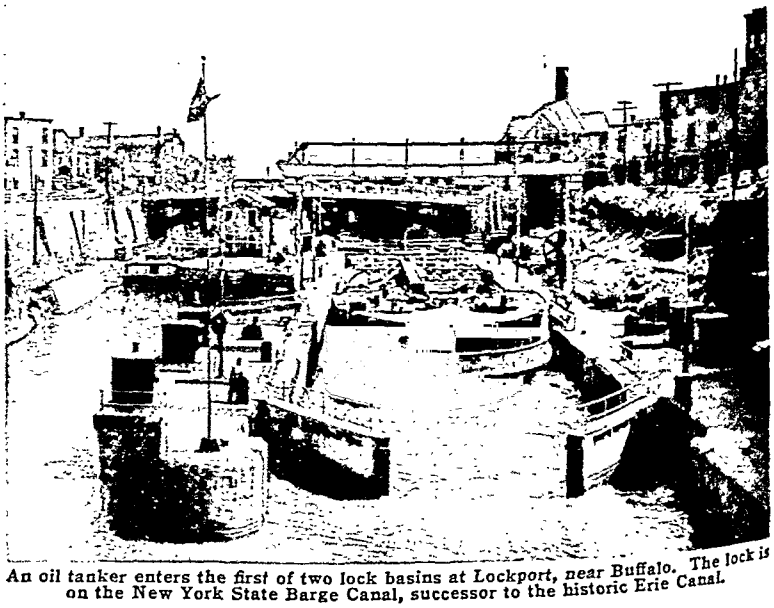
South of Albany and west of the Hudson River are the Catskill Mountains. This area has many lakes, the shores of which are lined with summer cottages and hotels. Here also is the giant Ashokan Reservoir which supplies water to New York City. A highway on the west bank of the Hudson offers many unusual scenic views, and passes near the United States Military Academy at West Point and through Bear Mountain State Park. Across the river from upper New York City are the Palisades of the Hudson. These are towering columns of black basalt (volcanic rock).

Low-lying Long Island, extending 110 miles, has many splendid beaches. During the summer these beaches are crowded with swimmers. At the eastern end is Montauk Point.

At Cohoes, a few miles north of Albany, is the eastern terminus of the Erie Canal. The canal route extends westward to Oneida Lake, some 20 miles long, and from there to Buffalo. The route passes just north of the beautiful Finger Lakes. In the extreme western county of the state is Lake Chautauqua. Both this lake and the Finger Lakes are popular summer resorts and camping areas.

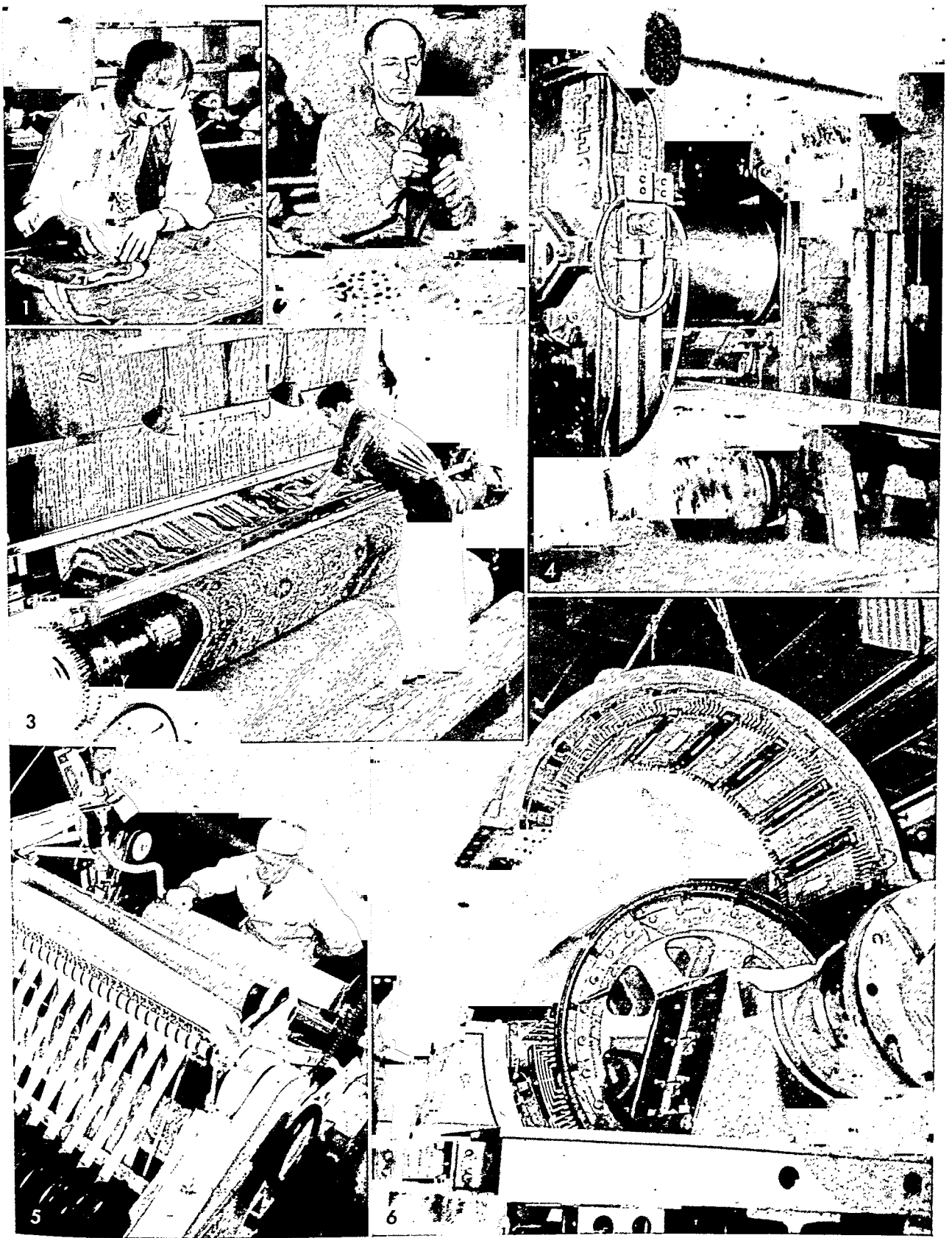
The Finger Lakes are several long, narrow bodies of water occupying deep, picturesque valleys in western

THE ERIE CANAL AT LOCKPORT



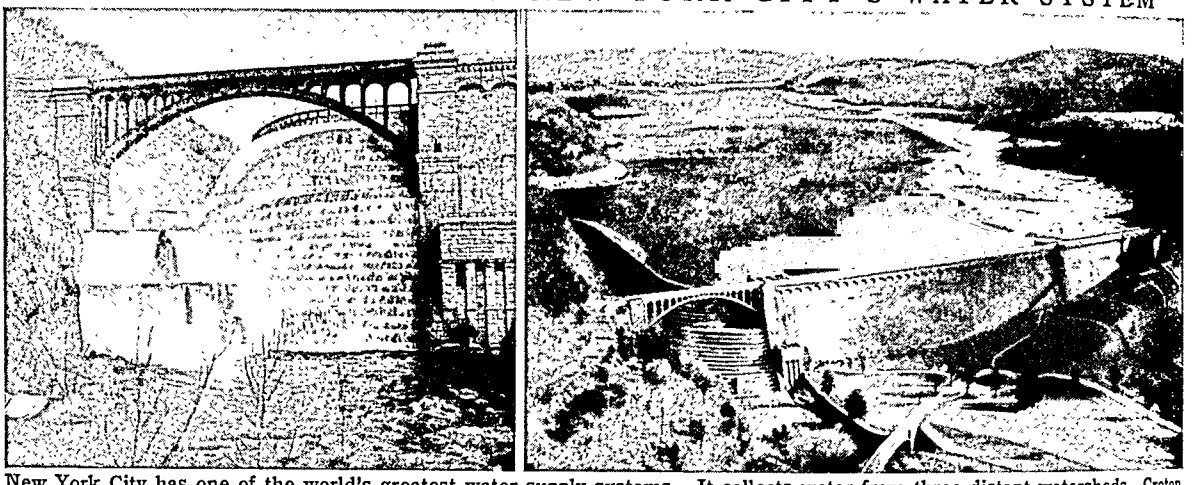
An oil tanker enters the first of two lock basins at Lockport, near Buffalo. The lock is on the New York State Barge Canal, successor to the historic Erie Canal.

SOME INDUSTRIES OF NEW YORK STATE



Here are products for which the state is famous. 1. Clothing: a worker is cutting out the lining for a coat. 2. Gloves: New York supplies three-fourths of all the gloves worn in America. 3. Carpets: a length of carpet rolls from a loom that automatically weaves the complex pattern. 4. Sheet metal: a roller mill turns out a long strip of copper. 5. Photographic materials: a wide band of film stock is cut into 35 mm.-strips for moving-picture cameras. 6. Electrical machinery: a 4,000 horsepower motor being assembled in General Electric works, Schenectady.

CROTON RESERVOIR OF NEW YORK CITY'S WATER SYSTEM



New York City has one of the world's greatest water-supply systems. It collects water from three distant watersheds—Croton, Catskill, and Delaware. They are as far as 125 miles away. Shown here (right) is Croton Reservoir at low-water level. It is formed by Croton Dam across the Croton River. When the reservoir is full, water overflows down Croton Dam spillway (left).

New York. Before the Ice Age, the sites were broad valleys draining to the southward. The Ice Age glaciers deepened the valleys and at the same time pushed huge mounds (moraines) of gravel and debris ahead of the ice to the southward. When the ice retreated the moraines were left and blocked the old drainage. Today the lakes drain to Lake Ontario. The most important of them are named Canandaigua, Keuka, Seneca, Cayuga, Owasco, and Skaneateles.

North of Buffalo are the famous Niagara Falls, a favorite spot for sight-seers from all over the world. In the area where the St. Lawrence River drains from Lake Ontario is the picturesque group of islets called the Thousand Islands. Some belong to New York and some to Ontario in Canada.

Development of Inland Transportation

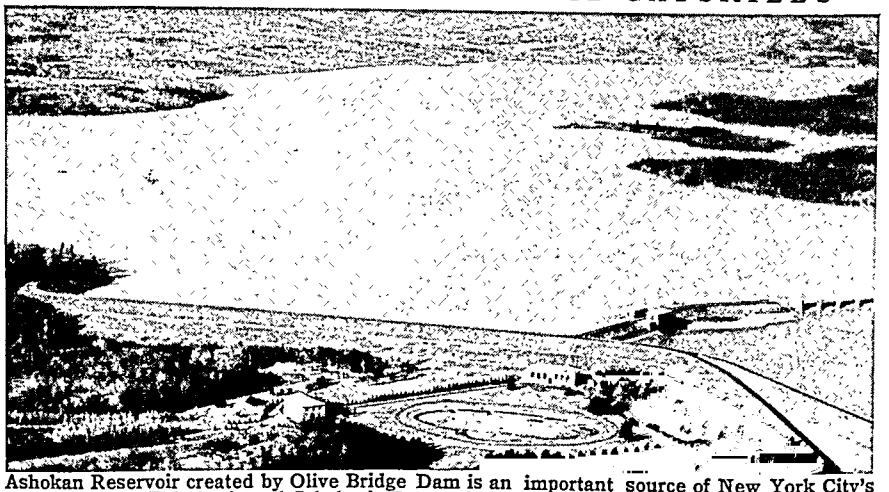
Improvement of New York's route to the west, which did so much for the state, began early in the 19th century. The Hudson River was navigable as far as Albany; and in 1807 Fulton's steamboat, the *Clermont*, made its first trip. Steamboat traffic grew rapidly and dominated this portion of the route for many years.

Between 1817 and 1825 New York added a westward link by building the Erie Canal from Troy on the Hudson through the Mohawk Valley, and then to the Niagara River above the falls. The canal made Buffalo the "great doorway of the Inland Seas" and gave New York a commanding position in handling freight and passenger traffic to and from the rapidly growing western states. (*See also* Canals).

In 1831 the Mohawk and Hudson Railroad was completed between Albany and Schenectady. Various short lines completed the rail link with Buffalo in the 1840's and were consolidated as the New York Central in 1853. In 1851 the Erie reached Lake Erie at Dunkirk. Meantime three rail connections were established between New York City and New England. The first ran by a roundabout route through western New England. Another, the New York and Harlem railroad was started north from New York City in 1832 and reached a terminus opposite Albany 20 years later. A third line, built along the east bank of the Hudson, made the connection first.

Until this system was completed, the Erie Canal did an enormous business. But in a few years mismanagement and railroad competition virtually put the canal out of business. In the first World War it was used again to relieve the overburdened railroads. In 1918 the canals were consolidated into a system called the New York State Barge Canal. It is now more than 800 miles long

ASHOKAN RESERVOIR IN THE CATSKILLS



Ashokan Reservoir created by Olive Bridge Dam is an important source of New York City's water supply. This basin and Schoharie Reservoir formed by Gilboa Dam hold water from the Catskill watershed. The city receives the water through the 92-mile Catskill Aqueduct.

The old Erie Canal, entirely rebuilt and called the Erie Division, is the most important part of the system's network. It is about 340 miles long and connects the Hudson River near Troy with the Niagara River at Tonawanda. The Champlain Canal branches from the Erie at Waterford, near Troy, and extends 60 miles north to Lake Champlain. The Oswego Canal is 24 miles long and joins Three River Point, on the Erie, with Lake Ontario. South of the Erie a 92-mile branch goes to Lake Seneca and Cayuga.

The channel of the canals is 12 feet deep and 75 to 200 feet wide. There are 57 locks. Several million tons of cargo move through the system every year. Leading cargoes are petroleum and its products, grain, pulpwood, paper products, and molasses.

Congress in 1954 authorized the United States to join Canada in the St. Lawrence Seaway navigation project. Upon its completion, seagoing ships will be able to sail up the St. Lawrence River and through the Great Lakes. Buffalo, on Lake Erie, and Rochester, on Lake Ontario, will become seaports. Thus New York will have ports for ocean vessels both on its eastern and on its western borders. Canals and locks will be built in the International Rapids below Ogdensburg. The Thousand Islands area will be dredged.

After 1900 New York developed an extensive network of highways. Fine expressways lead out from New York City to Long Island, Connecticut, and toward Albany. In 1950 the New York State Thruway Authority was created to build and operate a multilane express highway from New York City across the state to Pennsylvania by way of Albany and Buffalo. Branches will extend into New England. The total length will be 535 miles. This system is one of the greatest public works ever attempted by the state.

New York is crisscrossed by a dense network of railroads. Most of the nation's most important railroads enter the state. New York City is the main terminus of rail lines in the state and of important ones from Connecticut and New Jersey.

Manufacturing, Cities, and Trade

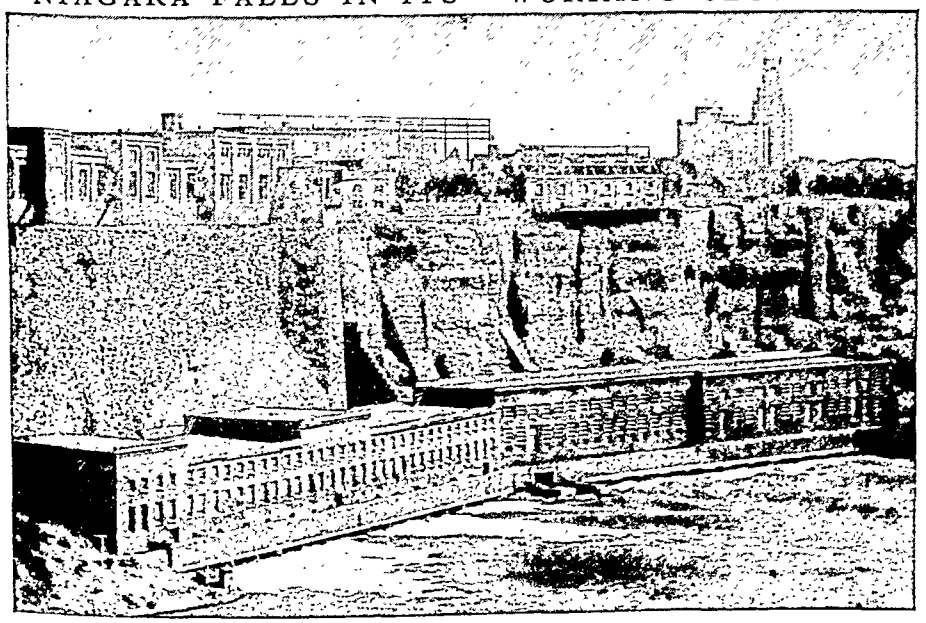
In manufacturing, New York State leads all states. More of its workers are employed in manufacturing than in any other occupation. The manufacture of men's and women's clothing is the leading industry. Second in importance is publishing—newspapers, periodicals, and books. New York leads the nation both in publishing and in garment manufacture. The state is also an important producer of chemicals and of machinery of various types. Food products, such as bread and bakery goods, stand high on the list of New York's manufactures, since the state's huge population demands large quantities of food.

New York City is the greatest manufacturing city in the world. Its largest industry is the making of apparel (*see* Garment Industry). Printing and publishing is the second most important industry. The city is the nation's great financial and stock-trading center. It is the home office of many industries located outside the state (*see* New York City)

Buffalo, the state's second largest city, has grain elevators, flour mills, and diversified industries (*see* Buffalo). Rochester, a lake port and railroad center, produces a variety of products. It is noted for photographic supplies (*see* Rochester). Syracuse also manufactures many kinds of goods (*see* Syracuse). Yonkers, adjoining New York City, is an industrial city and has shipyards (*see* Yonkers).

Albany, the state capital and Hudson River port, also has manufactures (*see* Albany) Utica too is a manufacturing center (*see* Utica). Schenectady is noted for its electrical industries and locomotives (*see* Schenectady). Niagara Falls, with vast resources of hydroelectric power at hand, manufactures many chemicals and chemical products, including carbon, graphite, and aluminum (*see* Niagara Falls).

NIAGARA FALLS IN ITS "WORKING CLOTHES"



The big Schoellkopf Station of the Niagara Mohawk Power Corporation at Niagara Falls, N. Y., develops 480,000 horsepower. Niagara Falls has a potential of 6,000,000 horsepower if all the water of the Niagara River could be used.

In both wholesale and retail trade, New York State is first in the nation. Its wholesale trade is nearly three times as large in dollar volume as its retail trade.

Still another important factor in the state's leadership is its importance in finance and corporation management. Apart from government agencies, New York City's banks are the richest in the world. The New York Stock Exchange leads in its field, and the city has many other important exchanges. In addition, many companies which operate nation-wide or even world-wide businesses have their corporate headquarters in New York City or elsewhere in the state. Thus New York shares in much of the profit that is obtained in other parts of the world.

Minerals and Power

New York is a leading state in the United States in both developed and undeveloped water power. The Niagara River is the state's great source of hydroelectric power. Powerhouses at the city of Niagara Falls generate and transmit electricity to Buffalo and many other cities. The upper Hudson, the Black River, the Oswego, and the Mohawk and its tributaries also furnish electric power.

In 1953 President Eisenhower authorized the New York State Power Authority to become the United States agent in constructing a hydroelectric power plant in the St. Lawrence River with Canada. It will be at Barnhardt Island in the International Rapids section between Massena and Cornwall, Ont.

The state, however, depends heavily on coal, petroleum, and natural gas for much of its power, light, and heat. For industrial uses, the state gets huge quantities of bituminous coal from Pennsylvania; for heating, it gets anthracite from the same state. Its petroleum and natural gas come mainly from Pennsylvania, the Middle West, and Texas and Oklahoma. The most valuable minerals produced within the state are stone for making cement and building purposes, iron ore, petroleum, sand and gravel, and salt.

An important problem throughout the state is water supply for the cities. New York City reaches to the Catskill Mountains and the Delaware River basin for its supply; and the impounding areas which supply other communities crowd together in many regions (*see* Aqueducts).

New York's Diversified Agriculture

Agriculture in New York State has specialized in supplying fresh foods to people in the state's large cities. New York City's 8 million people and the 1½ million people in other great cities provide an enormous market for such perishable foods as milk, fruit, and vegetables and for such bulk foods as potatoes. The state's farmers use most of the available land to meet this demand. New York gets foodstuffs such as wheat and meat in large part from less crowded states.

Only a small part of New York's workers are employed on farms, yet the state's farm income ranks fifth among all the states east of the Mississippi River. The chief agricultural industry is dairying. More than 3½ billion quarts of milk are produced each year. Most of the milk is sold to distributors or to creameries and cheese factories. In order to provide feed for stock, New York gives a greater acreage to hay than to any other crop.

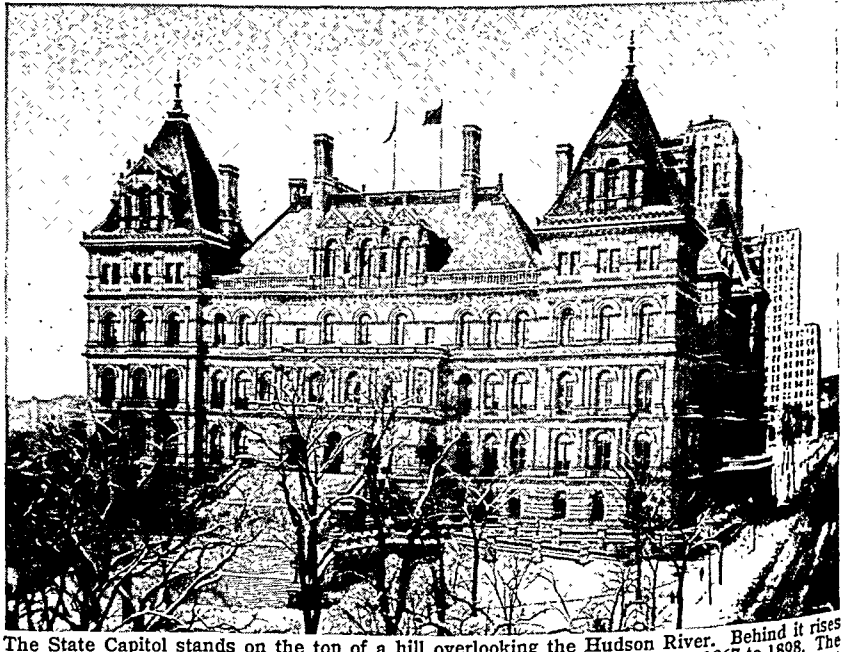
Truck crops are also an important source of farm income. The truck farms, located near the cities, supply fresh vegetables and fruit directly to city markets or to near-by canneries. Other leading farm products are eggs, cattle, potatoes, and corn.

Orchards and vineyards flourish along the southern shores of Lakes Erie and Ontario and in the Finger Lakes region. In these areas lake winds modify the extremes of summer and winter weather. Favorable climate and soil make it possible for the state to produce large crops of apples, peaches, pears, and grapes. Much of the grape crop is made into grape juice, wine, jelly, and jam.

Beginnings of New York History

Probably the first European to enter New York harbor was Giovanni da Verrazano, an Italian navigator exploring in the service of France. He is believed to have sailed his ship *La Dauphine* past Sandy Hook

THE IMPOSING CAPITOL AT ALBANY



The State Capitol stands on the top of a hill overlooking the Hudson River. Behind it rises the 33-story State Office Building. The Capitol was under construction from 1867 to 1898. The original designs were made by Thomas Fuller, the same architect who designed the Parliament Buildings for Canada. The buildings show many resemblances.

n 1524. The Frenchman Samuel de Champlain probably was the first white man to set foot within the limits of the state. He started south from Quebec early in 1609 and discovered the lake that is named after him. In September 1609, Henry Hudson, sent out by the Dutch East India Company to find a water route across the continent to the Pacific, sailed far up the Hudson River (*see* Hudson, Henry). His reports of the beauty and wealth of the country lured a few Dutch fur traders into the upper reaches of the river, and by 1614 they had constructed Fort Nassau on an island near the present city of Albany, as an outpost for trade with the Indians. In 1617 a flood destroyed the fort.

The First Colonists

In 1621 the Dutch started a West India Company, and in 1623 established the province of New Netherland. The first colonists were 30 families of Walloons, descendants of Protestant refugees from Belgium sent to the province by the West India Company in 1624. Some families traveled north along the Hudson and built Fort Orange on a site now embraced within the city of Albany. Other families established a trading post, New Amsterdam, on the southern tip of Manhattan Island. A few settled on Long Island.

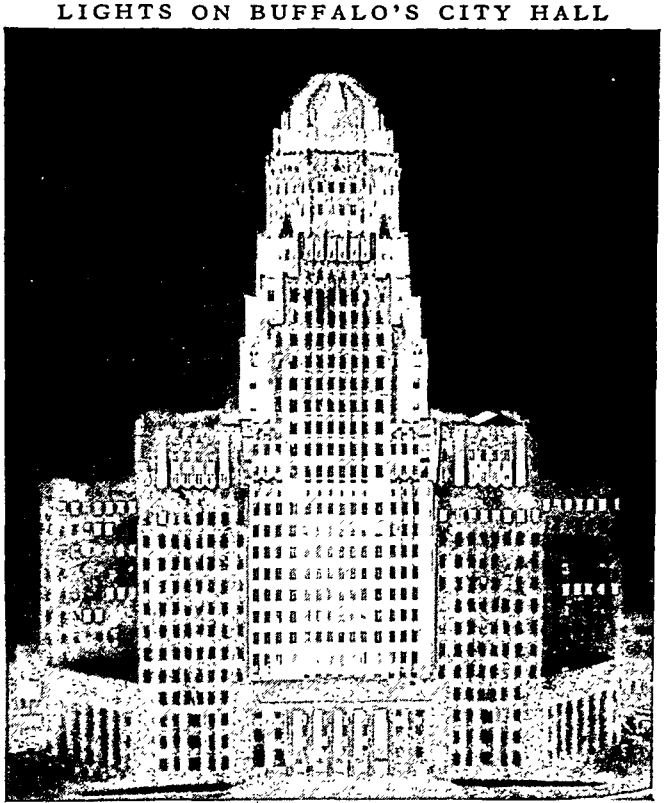
In 1626 the company appointed Peter Minuit its first director general. He bought permission from the Manhattan tribe of the Wappinger Confederacy to use Manhattan Island and build a fort on the site later called the Battery. He paid for this in trinkets worth about $24. The Indians did not think that they were selling the land but that they were granting permission to use it in common with themselves.

In 1628 the incompetent Wouter van Twiller was made governor general. He was recalled in 1637, and was succeeded by William Kieft the next year. Kieft's ten years of service were marked principally by strife and quarreling with the Indians, the English, and his own colonists.

Features of the Patroon System

Beginning in 1629, the Dutch West India Company conferred the title of *patroon* (patron) upon any one who would send to New Netherland a colony of 50 men and women over 15 years of age. The patroon, who became a member of the company, gave the money for transportation and supplies, and in return was allowed to select a tract of land along the Hudson River—eight miles on both sides or 16 miles on one side and as far inland as he cared to go. This plan, known as the "patroon system," was based on the feudal arrangement of a landed aristocracy. The patroons ruled their estates like lords, with full governmental and judicial powers. Manhattan Island was excepted in these grants. Kiliaen van Rensselaer of Amsterdam obtained a tract about Fort Orange, which has since become a greater part of the present counties of Albany, Rensselaer, and Columbia. Michael Poauw secured from the Indians Staten Island and the land on which Jersey City and Bayonne now stand.

LIGHTS ON BUFFALO'S CITY HALL



Floodlights at night show up the fine architectural details of Buffalo's $7,000,000 City Hall on Niagara Square, the civic center of the city.

End of Dutch Rule

Both the company and the patroons ruled their holdings entirely for their own profit, with little regard for the welfare of the colonists. Thus they failed to establish the loyalty and strength among their people which might have held the land for the Dutch against later English encroachment.

In 1647 Kieft was replaced by Peter Stuyvesant, a picturesque character with a wooden leg, which bore witness to his services in the Netherlands West Indian wars. Stuyvesant conquered the Swedish colonies on the Delaware, resisted the growing pressure from claims of the New England colonies and the jealous English government at home, and browbeat the Dutch settlers who clamored for greater self-government. He had a favorite expression: "We derive our authority from God and the Company and not from a few ignorant subjects." New Netherland prospered under him.

In 1664, during a war between the English and the Dutch, the English captured New Netherland, and Charles II gave the colony to his brother, the Duke of York, afterwards King James II. Both the city and the province were renamed New York in honor of the Duke. Col. Richard Nicolls, who commanded the fleet that took the city, was made governor, and was followed by Francis Lovelace in 1668. New York was recaptured in 1673 by a Dutch fleet, but was returned to the English in 1674.

Sir Edmund Andros was the first English governor after the war with Holland. Dissension with New

Jersey caused his recall, and in 1682 Thomas Dongan was made governor. In 1683 the "Charter of Liberties and Privileges," which granted freedom of religion to all Christians and suffrage to all freeholders, was drawn up by 17 representatives of the colony. This, the first bill of rights in America, was signed by the Duke of York, but he repudiated it when he became King James II shortly afterwards. Sir Edmund Andros became governor of the Dominion of New England in 1688, and New York was joined to this territory under Lieutenant-Governor Nicholson.

When the revolution broke out in England, many members of the colony sided with William and Mary. In 1689 Jacob Leisler, a colonist of German birth, led an insurrection against King James, and began to repair the fort at New York City. A battery of six guns was placed beyond its walls, and the park now standing on that spot is known as The Battery. William and Mary sent over Henry Sloughter as governor in 1691. Leisler finally surrendered to Sloughter and, after what was said to have been an unfair trial, was hanged for treason.

The period from 1690 to the American Revolution was marked by great corruption, but despite political disturbances the colony grew. From 1720 to 1771, the population increased from 31,000 whites and 4,000 Negroes to 150,000 whites and 18,000 Negroes.

Battle for Freedom of the Press

The first newspaper was the *Gazette*, a government organ established in 1725. In 1733 the *Weekly Journal* appeared in opposition to the colonial government. The publisher, a German immigrant named John Peter Zenger, was supported by Chief Justice Morris and others. He was imprisoned in 1735 on a charge of seditious libel, but a jury acquitted him. This verdict helped greatly to establish freedom of the press for the colonists with its implications that newspapers cannot be challenged for criticizing the government.

Sir William Johnson took an important part in the state's early history. He came to the colony in 1738 to manage his uncle's estate on the south side of the Mohawk, near Schenectady. There he learned the Indian language and was adopted into the Mohawk tribe as a sachem. Johnson, appointed colonel of the Six Nations in 1744, became a member of the provincial council in 1750, and in 1754 was a delegate from New York to the congress of Albany, and to the great council with the Indians. In 1755 General Braddock made Johnson "sole superintendent of the affairs of the Six United Nations, the allies and dependents" and he was commissioned to be Crown Representative to the Indians the following year. In 1764 Sir William built Johnson Hall, where he lived in true baronial style until his death in 1774. Johnstown, N. Y., was named after him.

Active in the American Revolution

New York was a leader in protesting against measures of the English Parliament which were unfair. It sent petitions to Parliament and to the king in 1764. Its assembly appointed a committee to correspond with the other provinces about the "common cause." A colonial congress assembled in New York in October 1765, and the refusal of the assembly to vote supplies for the British troops caused the battle of Golden Hill, on John Street in New York City, between the Sons of Liberty and British soldiers on Jan. 18, 1770. (*See also* Revolution, American.)

New York has long been considered a "pivotal state" in presidential elections because it has the largest vote in the Electoral College. Six presidents have been New York men. Four of them (Van Buren, Cleveland, Theodore Roosevelt, and Franklin D. Roosevelt) had served as governors. Another ex-governor, Samuel J. Tilden, missed election as president in 1876 by a few votes. As chairman of the Democratic state committee Tilden broke up the notorious "Tweed Ring" of New York City (*see* Tammany). He was governor 1874-76. When he died in 1886, he left part of his fortune for a free public library in New York City. With the Astor and Lenox libraries, it became the New York Public Library in 1895. (*See also* chronology in New York Fact Summary.)

The State's Great School System

New York State's education system had its beginnings in the schools established by the early Dutch settlers at their trading posts by the middle of the 17th century. Today, in addition to a splendid public school system, opportunities for higher education are offered in all parts of the state.

In New York City are Columbia University, at first King's College, 1754, Fordham University, College of the City of New York and its Hunter College for women, New York University, Manhattan College, College of Mount St. Vincent, Manhattanville College of the Sacred Heart, Cooper Union, Long Island University, Polytechnic Institute of Brooklyn, Pratt Institute, St. Francis College, St. Joseph's College for Women, State College of Medicine, and St. Joseph's University.

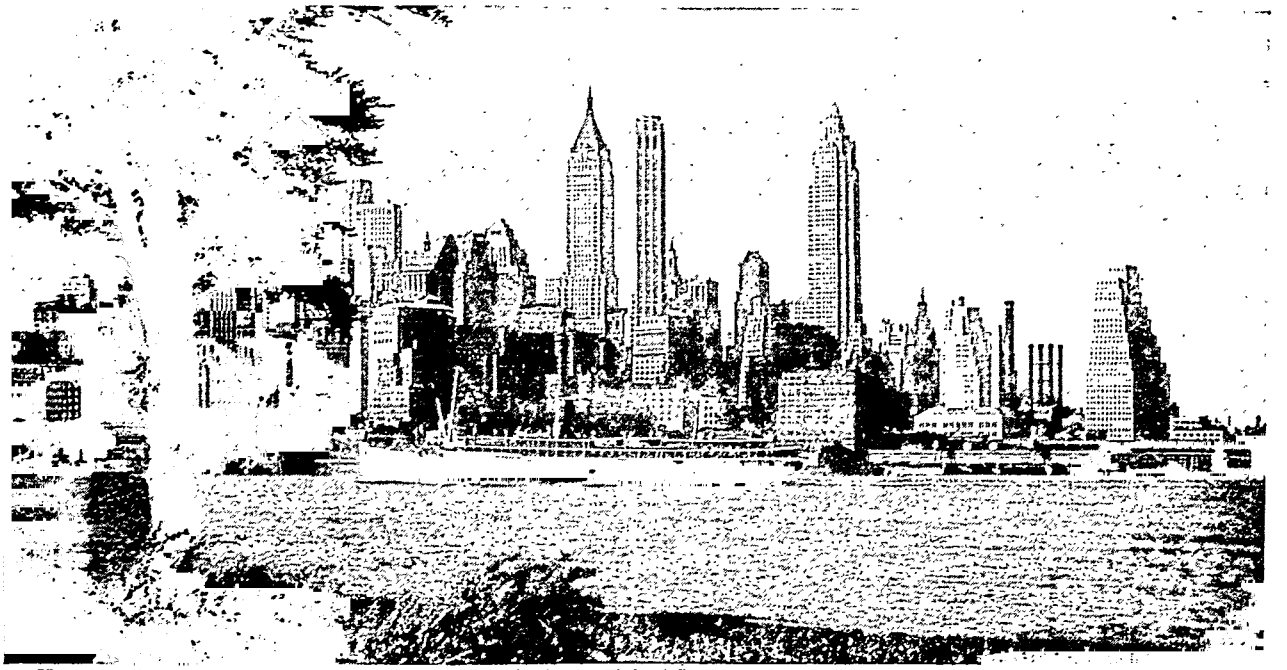
Cornell University, at which the state maintains Colleges of Agriculture and Home Economics, Veterinary College, and School of Industrial and Labor Relations, is at Ithaca.

Syracuse University, with State Colleges of Forestry and Medicine, is at Syracuse; University of Rochester, at Rochester; University of Buffalo, D'Youville College, and Canisius College, Buffalo; Union College, Schenectady; Adelphi College, Garden City; Hobart College, Geneva; St. Lawrence University, Canton; Alfred University, with State College of Ceramics, Alfred; Niagara University, Niagara Falls; Hamilton College, Clinton; Vassar College, Poughkeepsie; College of New Rochelle, New Rochelle; Elmira College, Elmira; Wells College, Aurora; Clarkson College of Technology, Potsdam; Rensselaer Polytechnic Institute, Troy; St. Bonaventure College and Seminary, St. Bonaventure; and Houghton College, Houghton.

New York State also supports 11 teachers colleges. The United States trains its army officers at West Point (*see* Military Academy, United States.)

See also United States, section "Middle Atlantic Region."

Tower-Topped METROPOLIS *of the* WESTERN WORLD



Here is a view of "downtown" New York, largest city in the United States and second largest in the world. In this scene from Governors Island are giant skyscrapers in lower Manhattan, a steamship on East River, and docks and piers. These are typical sights of the "Gateway to America"—the busiest port and one of the finest harbors in the world.

NEW YORK CITY. In wealth, industry, and commerce—in countless ways—New York today is the greatest city in the world. It is more than twice as large as any other city in the Western Hemisphere. Of the world's cities, only Greater London, with a population of more than 8,300,000, is larger.

The population of New York exceeds that of more than half the nations on earth. The sprawling New York-northeastern New Jersey metropolitan area contains nearly 13,000,000 people. This includes New York City, four nearby counties of New York State, and eight New Jersey counties.

Of all the nations of the Americas, only the United States has an annual budget exceeding that of New York City. The value of this giant city's imports and exports exceeds that of any other port. The city is the richest in the world, with hotels and homes of amazing luxury. Yet by walking a few minutes from the city's richest districts, one can find some of the most squalid, poverty-ridden tenements in America.

Visitors may think that by seeing the "midtown" district of hotels, shops, and theaters on Manhattan Island, they are "seeing New York." Actually this district, immense and rich as it is, counts for about as much as one block or so on "Main Street" in an average town. A better way to see New York is to view the city from the top of the Statue of Liberty—the colossal copper figure created by F. A. Bartholdi and presented to the United States by the French people in 1886. From the room in its head—a space large enough to hold 40 people—a breathtaking panorama spreads out in all directions.

The harbor itself furnishes many reasons for the greatness of "Manhattan" (the name often given to the entire city though properly it belongs only to the island that is its heart). Around Bedloe's Island lies a great land-locked bay, linked at the south to the Atlantic Ocean through the Narrows between Long and Staten islands. To the northeast, the East River connects with Long Island Sound and the waters skirting New England. To the north the Hudson River pierces far inland. New Yorkers still call the lower part of the Hudson "North River," to distinguish it from the Delaware, the "South River" of colonial days.

Population: (1950 census), 7,891,957. *Boroughs:* Kings (Brooklyn), 2,738,175; Manhattan, 1,960,101; Queens, 1,550,849; Bronx, 1,451,277; Richmond, 191,555. *Metropolitan area,* 12,911,994. Growth of city: *1900,* 3,437,202; *1910,* 4,766,883; *1920,* 5,620,048; *1930,* 6,930,446; *1940,* 7,454,995.

Area: 359.4 square miles. *Boroughs:* Queens, 120.6; Kings, 88.8; Richmond, 64.4; Bronx, 54.4; Manhattan, 31.2.

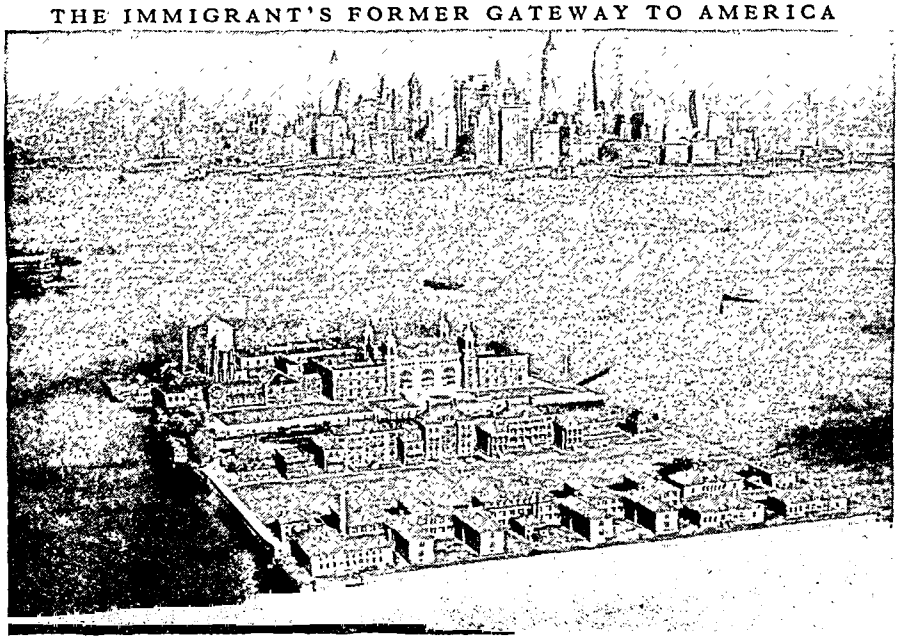
Location: (Manhattan Island) about 40° N., 73° W.

Climate: *Average temperatures*—annual, 52.7°; highest monthly, 74.4° (July); lowest monthly, 31.5° (February). *Average precipitation*—annual, 42.87 inches; monthly high, 4.37 inches (August); monthly low, 3.15 inches (November).

Port of New York: (New York City and parts of New York and New Jersey) about 200 deep-water piers; about 755 miles of water frontage. *Average annual shipping:* imports, 16,877,000 tons; exports, 12,404,000 tons; coastwise, 39,434,000 tons.

Transportation and Communication: *Bridges,* 9; *tunnels* (vehicular), 4; *railroads,* 12, with about 214,160,000 passengers a year; *airlines,* 28; *airports,* 4, with about 4,342,000 passengers a year; *telephones,* 3,043,533; *newspapers,* 20 daily, with about 6,641,000 circulation daily.

THE IMMIGRANT'S FORMER GATEWAY TO AMERICA



Here we see Ellis Island in New York Harbor. This famous immigration station was closed in November 1954. Formerly as many as a million people a year passed through it before being admitted to the United States. The three large windows in the building with "pepper pot" towers mark the detention room where the newcomers were examined. Today immigrants are examined at consulates abroad and need not be detained here. Other buildings include hospitals, quarters for the staff, and facilities for aliens detained for deportation. The 27½-acre island was made by filling in land around an original rocky islet of 3½ acres.

In all, New York City has 755 miles of water front. Sea contacts, and a population that was cosmopolitan from the first, explain the early love of amusement and fun which caused Washington Irving in his 'Salmagundi' to dub the city "Gotham," after an English village noted for frivolity. Today New York City is noted as a center of stage plays and other entertainment.

Facing north, we see another "gateway"—Ellis Island, which once admitted a large portion of all immigrants. Today the station is closed, as immigrants are examined abroad and cleared for entry (*see* Immigration). To the west we see thriving cities of New Jersey; but the great mass of Staten Island to the southwest belongs to New York state and city for an interesting reason. King James II had decreed in 1688 that all islands in the bay which could be circumnavigated in 24 hours should belong to New York. Capt. Christopher Billopp worked a boat through Kill van Kull and Arthur Kill to circle Staten Island in one day.

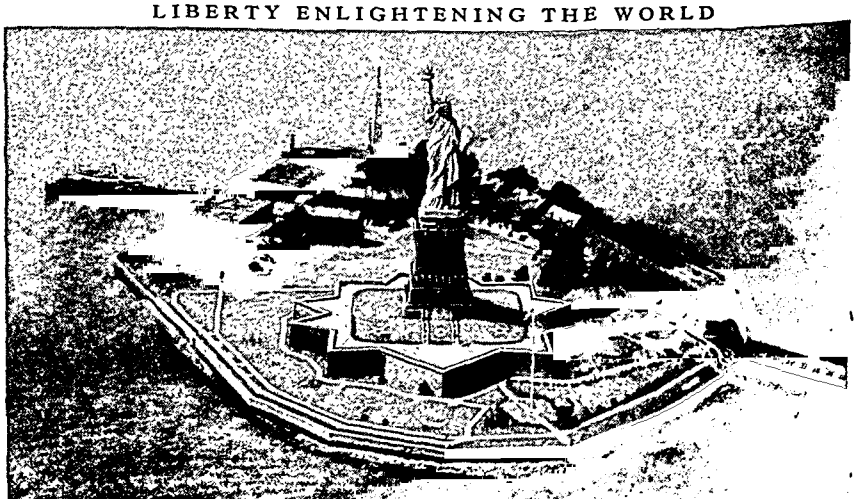
We cannot see much of the East River, which is really a strait three fourths of a mile wide, between Manhattan and Long Island. Since the rocks were blasted from Hell Gate toward its north end in 1885, it has been used by coastal steamers. Midway in its course is Welfare Island (once Blackwells), site of hospitals and a former city prison. Randalls, Wards, and Rikers islands have city institutions and playgrounds. At the "mouth" of the East River lies Governors Island, once the home of colonial governors, now used by the United States Army.

Giant Brooklyn

Across the bay to the east is the vast stretch of Brooklyn, on Long Island. Many know Brooklyn because of Coney Island, the amusement resort jutting into the Atlantic at the southwest tip of Long Island (*see* Coney Island). Yet it has many great industries and immense residential sections of tree-shaded homes. The borough of Brooklyn has the largest population of any of the five boroughs making up the city of New York. Every work day many thousands of people cross to Manhattan in the morning and return home in the evening. They use bridges, subway tubes, and a motor-vehicle tunnel which go over or under the East River and link Brooklyn and Manhattan (*see* Brooklyn).

When we return to Manhattan, we land at The Battery on its tip. Battery Park is a 21-acre open site once occupied by fortifications. Here for about a century and a half stood a landmark of New York, a big round structure built in 1808–11 as a fort.

LIBERTY ENLIGHTENING THE WORLD



Incoming travelers by sea cannot miss the Statue of Liberty. It rises above old Fort Wood on tiny Bedloe's Island, over against "the Jersey side." From a ship one sees only the giant statue. This air view shows the star-shaped fort walls, built to provide defense against attack from any angle. The article Liberty, Statue of, tells the statue's story.

It was then known as the West Battery. After the War of 1812 it was called Castle Clinton. When its usefulness as a harbor fort ended it became a coliseum known as Castle Garden. Here such notables as Lafayette, Louis Kossuth, and Edward VII, then Prince of Wales, were entertained. Jenny Lind, the Swedish singer, made her American debut here in 1850. From 1855 to 1890 Castle Garden was an immigrant receiving station. For six years it was closed. From 1896 to 1941 it was the city Aquarium. It was partly demolished in 1942 to make room for the Brooklyn Battery Tunnel. In 1950 it became a national monument. It is planned to restore the fort.

Crowded Manhattan

Manhattan Island is only 12½ miles long and between 1 and 2½ miles wide. One can walk across it in half an hour. Its area of 31 square miles is only a small part of the city's 323 square miles; yet a quarter of the city's total population lives here, closely crowded in lofty apartment buildings. The average square mile houses some 87,000—about one half as many as live in all Nevada. In addition, about a million people come here every day to work from homes in three states. To these millions of permanent residents and suburban workers must be added scores of thousands of visitors who arrive every day. About 63 per cent of the area is residential. Business occupies 23 per cent, and 14 per cent is given over to parks and playgrounds.

To house its business activities, Manhattan has the highest skyscrapers in the world, topped by the tallest man-made structure of all, the Empire State Building. Such building was made easier by the fact that the island is solid rock to within a few feet of the surface.

The Street Plan

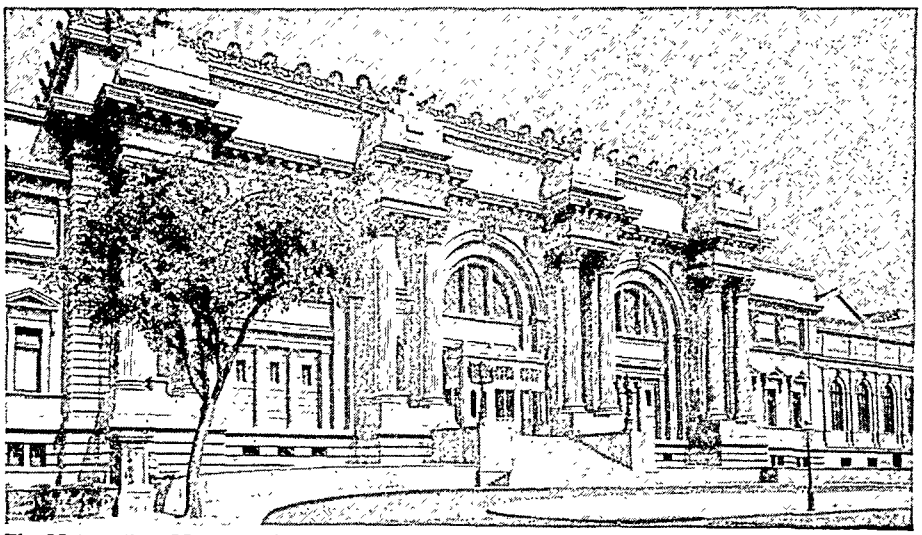
The shape and street layout of Manhattan make it easy for us to survey the island. The present street plan was devised in 1811, to provide orderly growth beyond the "crazy quilt" area of the old

TWO NEW YORK CITY LANDMARKS



The Empire State Building (top), the world's tallest, soars 1,472 feet above Fifth Avenue and Thirty-fourth Street. When completed in 1931, it was 1,250 feet. A television tower has increased its height. Its 102 stories can house 25,000 office workers. The New York Public Library (bottom) is at Fifth Avenue and Forty-second Street, north of the Empire State Building.

A GREAT MUSEUM OF ART



The Metropolitan Museum of Art is in Central Park facing Fifth Avenue. It houses one of the world's greatest art collections and one of the largest general collections in the United States.

town. Many east-west *streets*, numbered northward, connected the two rivers. About 12 *avenues*, numbered from First Avenue on the east, ran north and south. This was done because the planners thought that industry would hug the river banks and most of the traffic would move east or west. Actually, the growth of New York has thrown most of the traffic burden on the few north and south avenues. The city has spent hundreds of millions of dollars to remedy this old error in city planning.

Manhattan's Crowded "Downtown"

To find his way about Manhattan, a visitor needs remember only one street in addition to the numbered streets and avenues. This street is Broadway. It starts at the tip of the island and runs approximately north. Since the island slants toward the northeast, Broadway seems to angle westward across the avenues. Far beyond the city it becomes the Albany Post Road to upper New York State. Nearly all Manhattan is within a few blocks of Broadway.

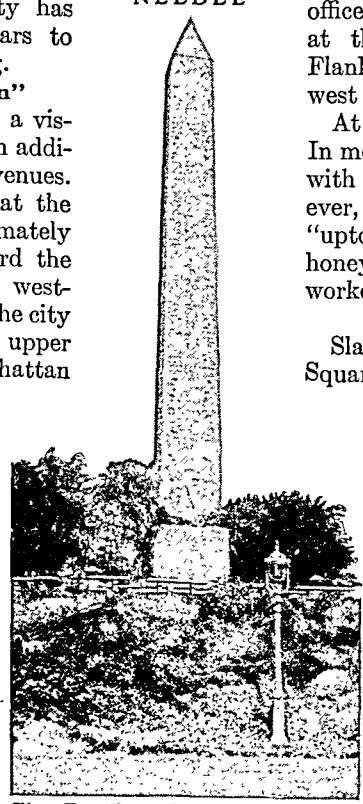
We can start our tour of Manhattan where Broadway starts—at Bowling Green, a little park adjoining Battery Park. Here Dutch settlers had a smooth grass plot for playing bowls. Near by is a shipping district, with steamship offices, the Customhouse, and business offices.

About a quarter-mile north we come to Wall Street, where a Dutch wall once kept out Indians. It runs east from Broadway. Opposite its end is Trinity Church. Alexander Hamilton, Robert Fulton, and other notables are buried in the churchyard. One block to the east is "the narrow street called Broad." It becomes Nassau Street north of Wall.

At the corner of Broad and Wall we are in the "financial heart" of America. On the northeast corner is the United States Subtreasury Building. It stands on the site of Federal Hall where George Washington was inaugurated as president. In 1939 it became a national historic site. On the southeast corner is J. P. Morgan and Company. The New York Stock Exchange is on the southwest corner.

A few blocks farther north we come to Maiden Lane and John Street, headquarters of the wholesale jewelers. In John Street diamond merchants trade with one another; at one time many carried fortunes in loose stones in their pockets. A few blocks north is City Hall Square. In Revolutionary days this was an open common on the edge of town. Here are the City Hall and the County Building. They were long ago outgrown, and most of the city's office work is done in the Municipal Building at the northeast corner of the square. Flanking this building to the south is the west end of Brooklyn Bridge.

CLEOPATRA'S NEEDLE



The Egyptian obelisk called Cleopatra's Needle stands in Central Park. It dates from 1600 B.C.

At night, downtown New York is deserted. In most cities, "downtown" is filled at night with pleasure seekers. In New York, however, everything except business has moved "uptown." Every afternoon the subways honeycombing the district whisk away all workers, like some giant vacuum cleaner.

The Lower East Side

Slanting off northeast from City Hall Square is Park Row, once the home of most New York newspapers. Park Row ends after a quarter of a mile at Chatham Square, alongside Chinatown. The Bowery runs north from here. Its name comes from Peter Stuyvesant's *bouwerij* or farm, which it crossed. After the Civil War the Bowery became the home of sailors and "down and outers"; so in those days Chatham Square, called "Five Points" from the streets meeting there, was one of the world's "toughest" spots.

East of the Bowery we can explore New York's East Side. Modern housing projects here have helped relieve the congestion of a large foreign-born population. A feature

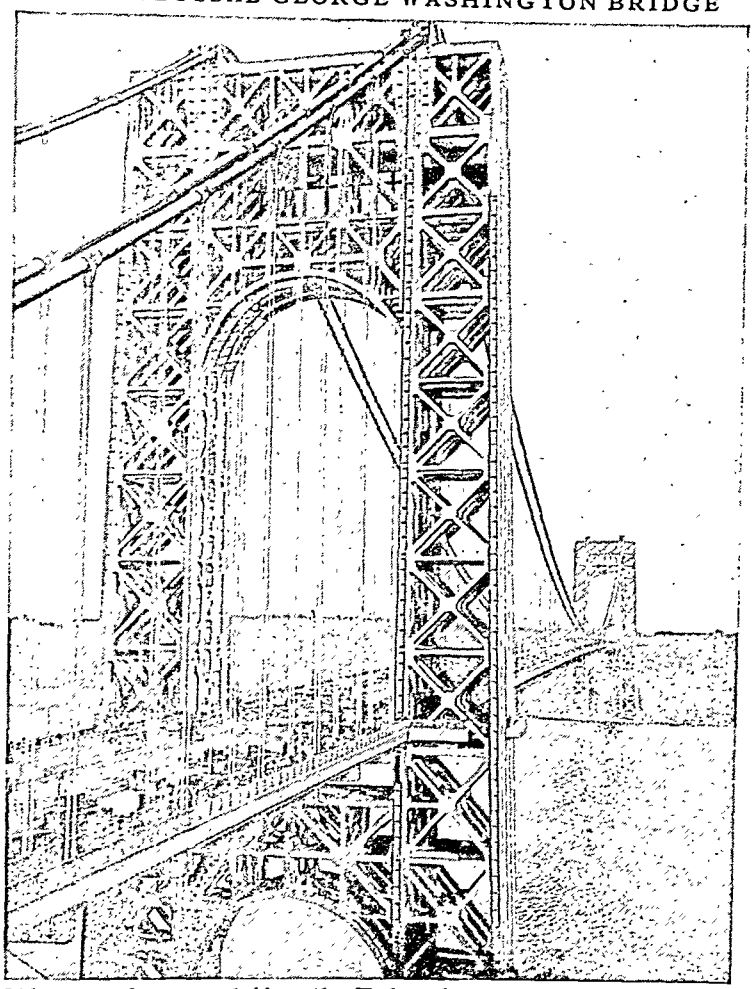
that attracts many visitors to the district is the Jewish area centering on Hester Street.

Running north from City Hall Square is Centre Street. On this street are the new Criminal Courts Building and the new skyscraper City Prison. They replace the old prison, the "Tombs," and the old court building, once connected by the "Bridge of Sighs." Broadway runs north through a wholesale machinery district. A detour west brings us to Washington Square, with its huge arch honoring George Washington.

Around the Square stand close-packed homes once inhabited by the well-to-do. Now this quiet area has been invaded by the downtown buildings of New York University, some apartment hotels, and, to the southwest, "Greenwich Village." This is a district of tenements in which many artists and writers have settled.

Beginning at Washington Square and running north we see Fifth Avenue, important to most women visitors because of its splendid shops. We follow it north to where we meet the diagonal swing of Broadway at 23d Street. Here is Madison Square. Toward the end of the 19th century, this was the heart of "gay life" in New York, with its hotels and amusement places. Today the clothing industry has swamped the region, and spreads up Broadway and to the west, almost to the new amusement zone beginning at 42d Street. The resulting loss in real estate values was one reason for New York's zoning law, which bars factories from residential and commercial districts. Looking back from Madison Square *down* Broadway to Fourteenth Street, we see an old-time shopping center, with its stores featuring "bargain merchandise." There also is the famous Union Square, the traditional spot where agitators are allowed to air their views. After crossing Fifth Avenue, Broadway leads to the largest department stores in the city, and probably in the world, at 34th Street. One block west of Broadway, between 32d and 33d, is the huge Pennsylvania Railroad station, backed by one of New York's principal postoffices.

THE COLOSSAL GEORGE WASHINGTON BRIDGE



This tremendous span bridges the Hudson from the Fort Lee district in New Jersey, where we stand, to the Fort Washington district of upper Manhattan. The two forts were built in 1776 to hold the Hudson against the British. The bridge, which has a 3,500-foot span, cost $60,000,000.

Many Features of "Midtown"

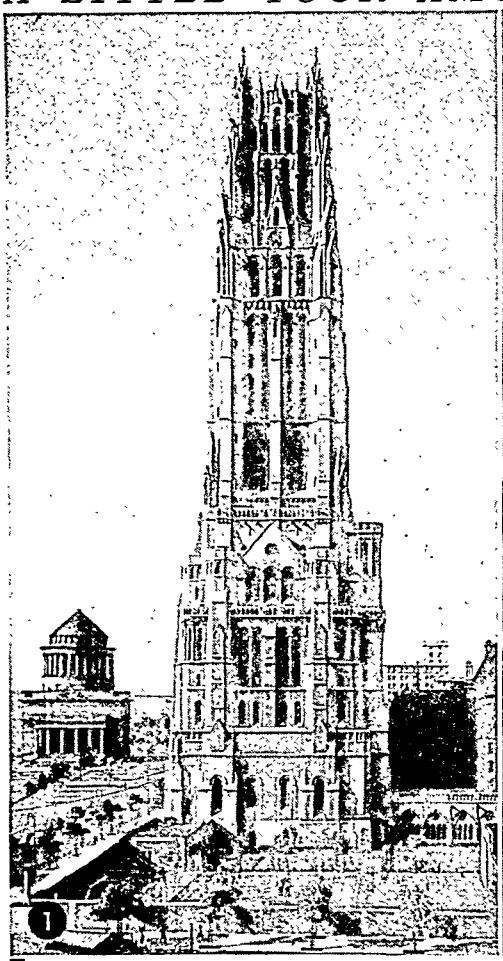
Returning at this point to Fifth Avenue, we find ourselves entering "midtown" New York, another region of skyscrapers. At 42d Street we come to the Public Library, which has some 3,000,000 volumes on about 80 miles of bookshelves. It houses many priceless collections, including the old Astor, Lenox, and Tilden libraries.

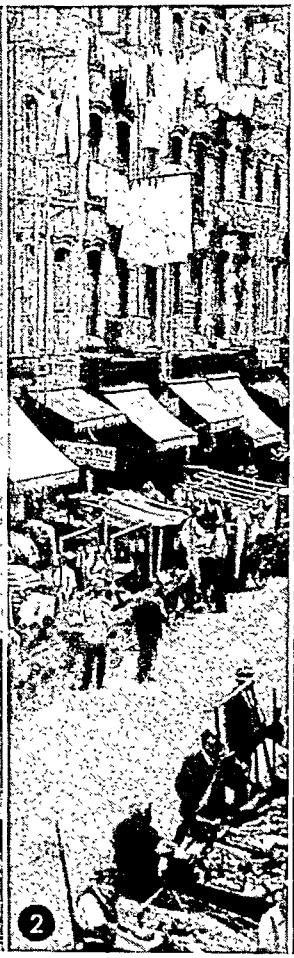
Two blocks east of the Library is the Grand Central Railroad station. The first station here was built after the Civil War by Commodore Vanderbilt. He had a terminal near Madison Square, but when corrupt politicians tried to extort money from him for franchise privileges, he built a new station at 42d Street, which was then far uptown, and said that he "would bring the city to the trains." When the lines entering the Grand Central were electrified after 1906, the tracks, going north in Park Avenue, were roofed over as far as 96th Street; and Park Avenue became a fashionable hotel and apartment street.

If we continue north on Fifth Avenue, we pass St. Patrick's Cathedral at 50th Street, opposite the huge Rockefeller Center group of buildings. At 59th we come to Central Park, which is bounded on the east by Fifth Avenue. Another interesting route from 42d Street and Fifth Avenue takes us west again to where Broadway crosses 42d Street and Seventh Avenue at Times Square. Here beneath our feet is probably the busiest subway station in the world, with four lines crossing at different levels. Times Square is the center of the amusement district. Theaters cluster so thick along the square and the adjoining streets that at night people and vehicles can hardly move.

At 59th Street and Columbus Circle, Broadway crosses Eighth Avenue and also touches the southwest corner of Central Park. Above 59th Street Manhattan

A LITTLE TOUR AMONG THE MANY FASCINATING



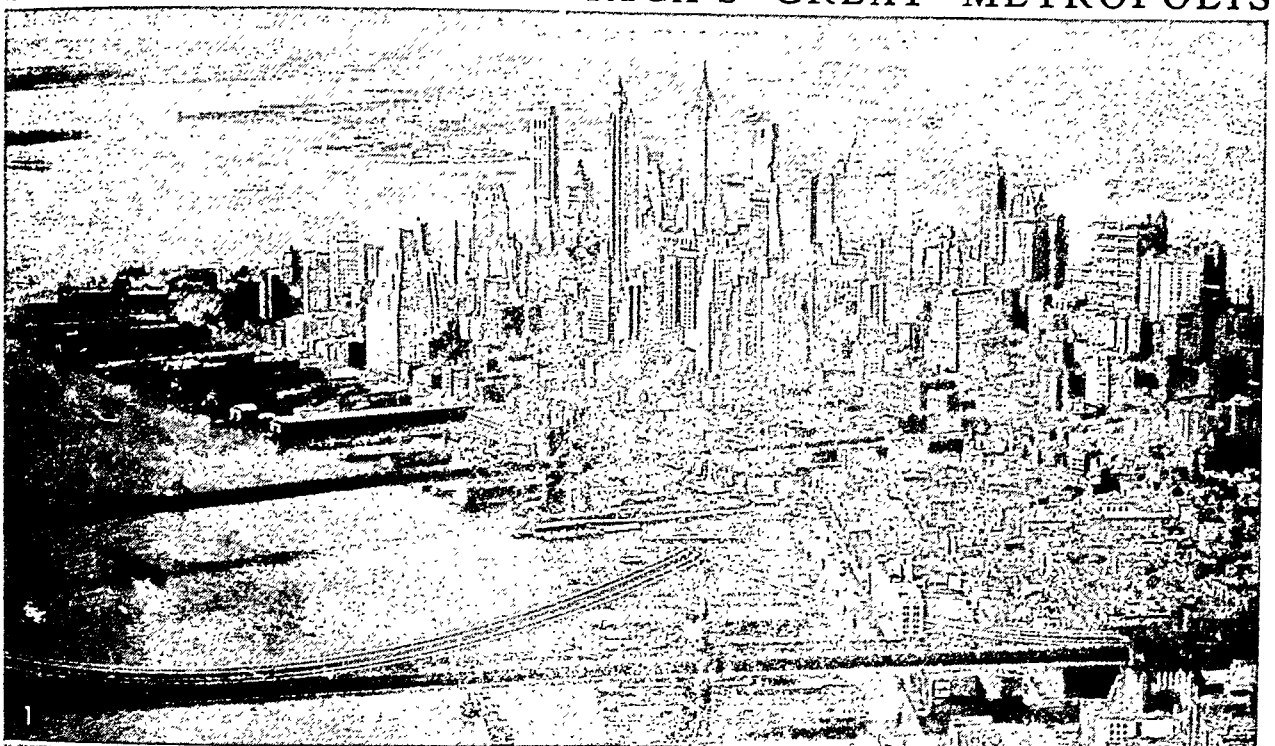


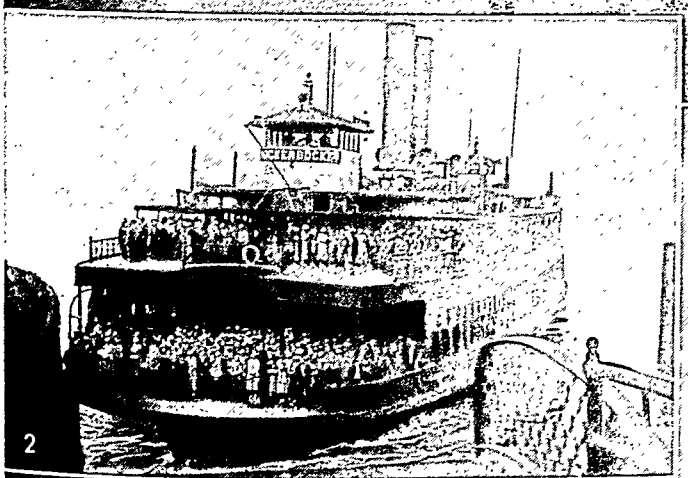


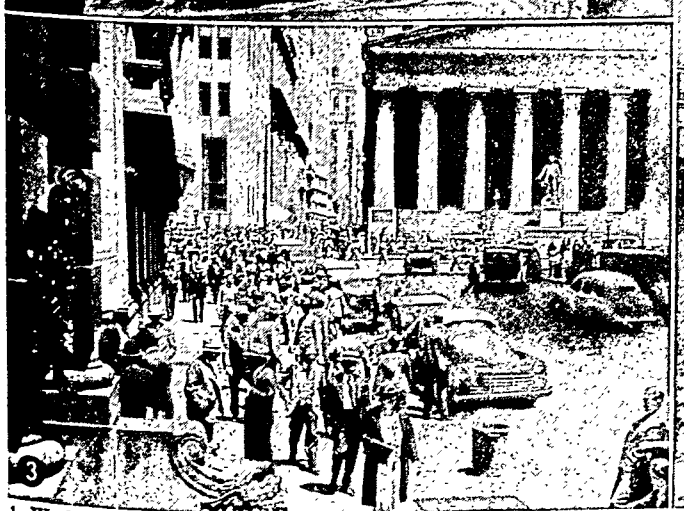


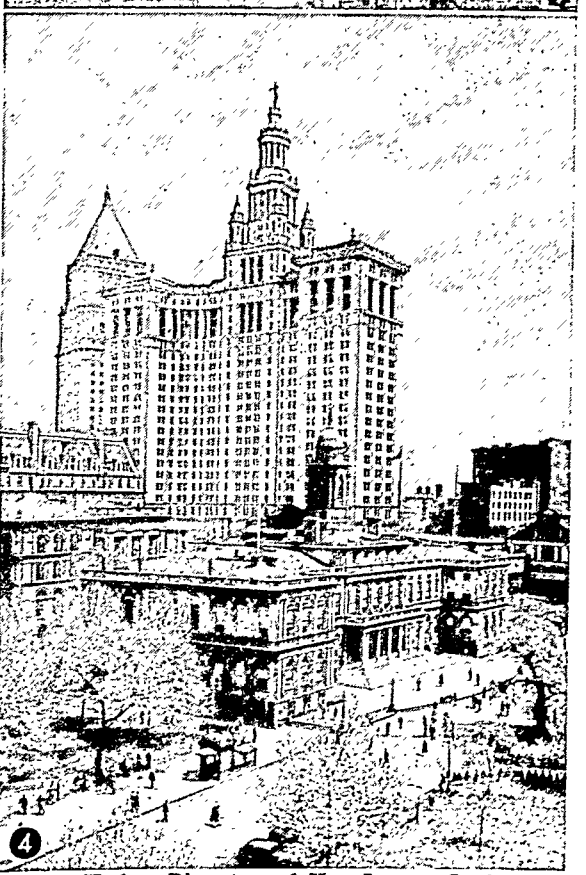
1. The Gothic tower of the nonsectarian Riverside Church rises high above Riverside Drive and the Hudson River. In the background at the left is the tomb of President Grant. 2. The poverty of this East Side slum, with its pushcarts and washing hung over the street, contrasts with the luxurious skyscraper hotels (3) overlooking Central Park at Fifth Avenue and 59th Street. 4. Broadway at the left and Seventh Avenue at the right run north from Times Square in all their night-time glitter. The theater district centering at Times Square extends from Fifth to Eighth Avenue and from 39th to 57th Street.

SCENES OF NORTH AMERICA'S GREAT METROPOLIS



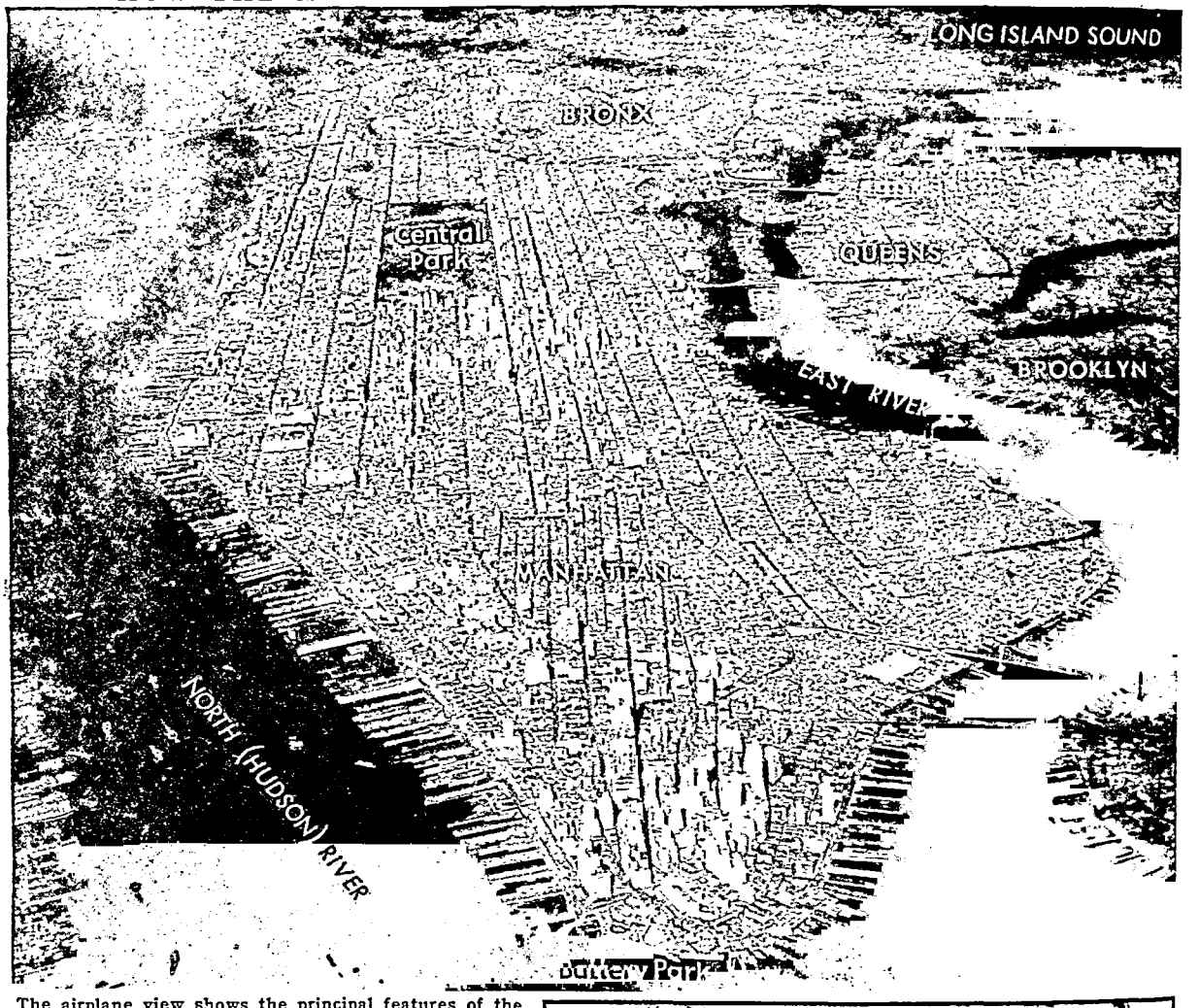




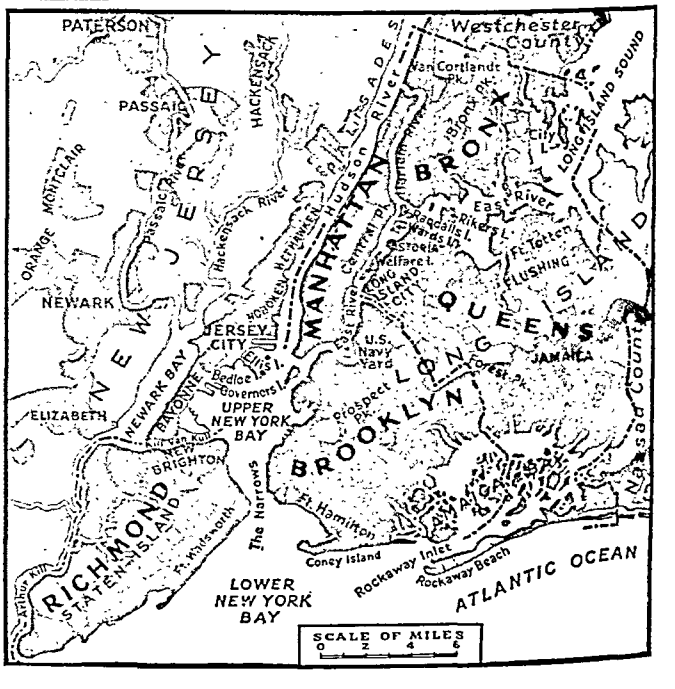


1. We look from the northeast across the East River, "downtown," and the Hudson River toward New Jersey. In the foreground is Manhattan Bridge, with Brooklyn Bridge beyond. 2. Staten Islanders come to work in Manhattan by ferry. 3. The Subtreasury Building is in the heart of the Wall Street district. A statue of George Washington stands on the spot where he took the oath of office as president in 1789. 4. The old City Hall, completed in 1811, houses the City Council and the mayor's office. Behind it are the City Court Building and the Hall of Records. The 40-story Municipal Building rises in the background.

HOW THE AIR MAN AND THE MAP MAN SEE NEW YORK



The airplane view shows the principal features of the city's geography, with Manhattan Island in the center. The midtown business and amusement district is just south of Central Park. In the map below, heavy shading indicates the densely populated areas.



becomes definitely residential, although the blocks are still built solid with almost no trees or grass. At 116th Street, Broadway divides the campus of Columbia University (established as King's College in 1754). Some 70 buildings of the university are grouped on Morningside Heights. Near by is the magnificent Protestant Episcopal Cathedral of St. John the Divine, the world's largest. Another interesting trip in upper Manhattan is on Riverside Drive from 72nd Street north along the high bluff overlooking the Hudson to the George Washington Bridge at 178th Street. Parallel to it, lower and nearer the river, is the Henry Hudson Parkway. This express drive extends from the elevated West Side Highway to Westchester County. It crosses a ship canal connecting the Harlem and Hudson rivers. The western part of the canal was formerly Spuyten Duyvil ("Spitting Devil") Creek.

Most famous of New York's parks is Central Park. In it is the Metropolitan Museum of Art; near by is the American Museum of Natural History. The Bronx, northeast of Manhattan, has Van Cortland Park; Bronx Park, noted for its zoo and botanical gardens; and Pelham Bay Park, with eight miles of water front. Prospect Park, the largest, is in Brooklyn. The World's Fair site (1939–40) is now Flushing Meadow Park.

New York's People and Schools

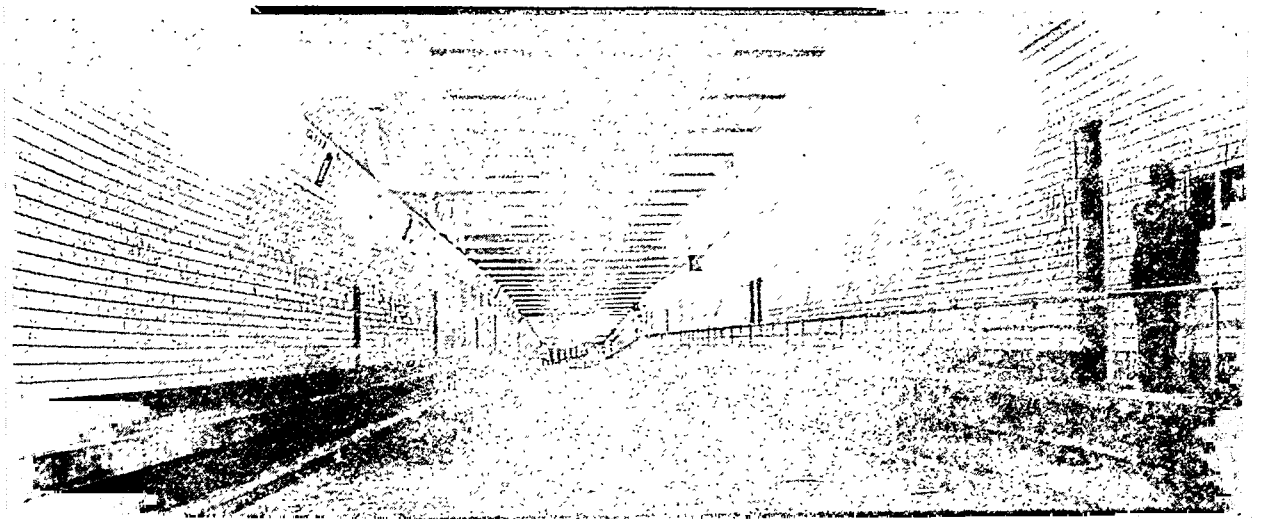
The people of New York have come from almost every land in the world. Many of them are either foreign born or the children of foreign born. Prominent in the population are Americans of Italian, Russian, German, Irish, Polish, and Austrian descent. New Yorkers often boast that there are more Italians in New York City than in Naples, more Germans than in Bremen, more Irish than in Belfast, and more Jews than in any other city. There are still foreign-background neighborhoods such as "Little Italy" and "Chinatown," and German, French, Russian, and Greek areas. There are also many newcomers from Puerto Rico who have settled in or near Harlem, the world's largest Negro community.

These varied groups have had special problems. Many had to learn English and "the American way of life"; yet it was desirable to preserve valuable Old World customs. Both the newer- and the older-stock Americans also faced the task of building good will and co-operation among peoples of many different nationalities, races, and religious faiths.

In addition to its elementary and high schools, which enroll more than a million pupils, New York has many institutions of higher learning. The city maintains the College of the City of New York, which comprises four colleges: City College, Hunter College, Brooklyn College, and Queens College. Private institutions include Columbia University, with Teachers College and Barnard College (for women); New York University, with its Hall of Fame (*see* Hall of Fame); and Fordham University (Catholic, for men). Cooper Union is one of the country's best-known technological institutions. Scores of other schools provide specialized instruction.

A great problem of New York is to obtain over a billion gallons of water daily. It must reach out almost 125 miles to tap three main watersheds. The Croton watershed has 12 reservoirs. The 92-mile Catskill Aqueduct carries water from the Ashokan and Schoharie reservoirs (*see* Aqueduct). The Delaware River watershed began supplying water through the 85-mile Delaware Aqueduct in 1944.

MOTOR TUNNEL LINKS NEW YORK AND "JERSEY"



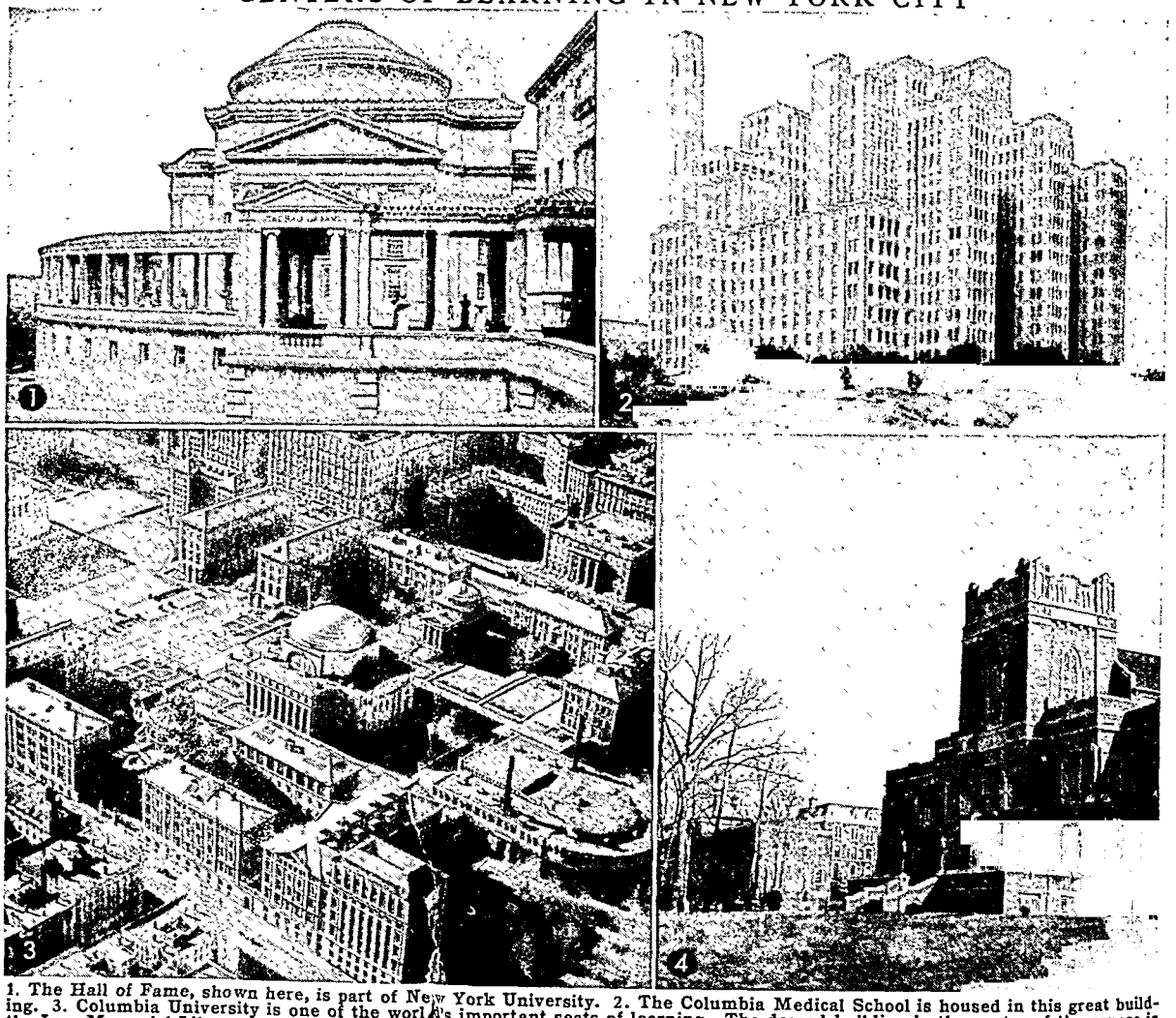
On a busy day 50,000 motor vehicles pour through this tube and its twin which form the Holland Tunnel under the Hudson River between New York City and Jersey City. Blower fans in those ceiling vents change the air automatically 42 times an hour, or oftener when "robot" electrical devices warn the engineers in charge that the air is dangerously heavy with exhaust gases. The tubes are 9,250 feet long—nearly two miles. Emergency phones hang along the walk on the right.

Traffic and Transportation Problems

Providing adequate transportation is a never-ending problem. The local facilities provide about 3½ billion rides a year, or enough to give 23 rides to every person in the United States. Railroads and ferries provide about 250 million more rides for visitors and commuters. As early as 1870 Manhattan had its first elevated railroad; in 1904 the first subway was completed. Today the island is honeycombed with municipally owned subways, which have replaced nearly all elevated lines of earlier days. In 1950 the world's largest bus terminal for commuters and long-distance travelers was opened in Manhattan. Express motor highways girdle the city. Along the west edge of Manhattan are an elevated express highway and the Henry Hudson Parkway. Along the east edge of the island near the East River is the Franklin D. Roosevelt Drive. Other parkways skirt or cut through the Bronx, Queens, and Brooklyn. These speedways aid motorists to get into and out of the city.

Vehicles and rapid-transit trains cross the East River on the Brooklyn, Manhattan, Williamsburgh, and Queensborough bridges. The Triborough and Bronx-Whitestone bridges carry motor traffic only. Tunnels are provided for subway and railroad trains.

CENTERS OF LEARNING IN NEW YORK CITY



1. The Hall of Fame, shown here, is part of New York University. 2. The Columbia Medical School is housed in this great building. 3. Columbia University is one of the world's important seats of learning. The domed building in the center of the square is the Low Memorial Library. The horseshoe-shaped building at the right is the gymnasium. St. Paul's Chapel is the small domed building in the left foreground. 4. Fordham University is one of America's large Roman Catholic institutions.

The Midtown-Queens vehicular tunnel was opened in 1940. The 9,117-foot Brooklyn Battery Tunnel, opened in 1950, is the second longest underwater vehicular tunnel in the world.

Manhattan and New Jersey are connected by the George Washington Bridge, opened in 1931, and by the Holland and Lincoln tunnels for motor vehicles. The Hudson tubes, opened in 1908 and 1909, carry passengers between Manhattan and New Jersey cities as far as Newark. Staten Island is connected with Manhattan by ferry and with New Jersey by three huge bridges. Most of the western railroads stop on the west bank of the Hudson, but tunnels provide an entrance to the Pennsylvania Terminal on Manhattan. Railroads from the north and northeast use the Grand Central Terminal.

An Aviation Center

New York City has four large commercial airports in its metropolitan area, all under control of the Port of New York Authority. La Guardia, the municipal airport in Queens, was opened in 1939. International Airport (Idlewild), in South Queens, is the world's largest. Opened to commercial aviation in 1948, it covers 4,900 acres. Two other airports, Newark and Teterboro, are across the Hudson in New Jersey.

New York's Leadership in the Arts

With its many museums, art galleries, and concert halls, New York is the artistic center of the nation. The Metropolitan Museum of Art, on Fifth Avenue in Central Park, has the largest general collection in America. The Junior Museum, opened in 1941, is devoted to exhibits illustrating American history.

Associated with the Metropolitan Museum is The Cloisters. It is a collection of medieval sculpture and architectural material assembled by George Grey Barnard. The building overlooks the Hudson River in Fort Tryon Park, at the north end of Manhattan. It was developed around architectural elements dating from the 12th to the 15th centuries from the cloisters of five French monasteries. Among its most valuable possessions are the Unicorn tapestries (for illustration in color, *see* Tapestry).

The American Museum of Natural History on Central Park West is one of the world's largest institutions devoted to natural science. Its lectures, circulating collections, nature hikes, radio broadcasts, and many other services reach more than 40 million people every year. (For illustrations in color of museum exhibits, *see* North America; Arctic Regions.) The Hayden Planetarium is a part of this museum. The Museum of Modern Art encourages the study and appreciation of all the modern visual arts, including modern painting, photography, motion pictures, architecture, and theater and industrial design. Midtown in Rockefeller Center is the Museum of Science and Industry.

In Washington Heights at 155th Street and Broadway are notable museums and learned societies—the Museum of the American Indian (Heye Foundation), the American Geographical Society, the Hispanic Society of America, the American Numismatic Society, and the American Academy of Arts and Letters.

Two great musical organizations have become national institutions through their radio broadcasts—the Metropolitan Opera Association and the Philharmonic Symphony Orchestra. The City Center of Music and Drama, organized in 1943, has its own symphony orchestra and opera company. It is supported by a membership corporation. It pays only the taxes on its building and divides any profits with the city.

High Rank in Business, Finance, Industry

The value of the foreign trade passing through the Port of New York is almost half the total for the entire United States. New York is also a world center of finance. Here are the nation's most important exchanges (the Stock Exchange, the "Curb," and the Cotton Exchange) and its largest banks and trust companies, all served by the great New York Clearinghouse. The value of the city's real estate is greater than that of the next seven cities of America combined.

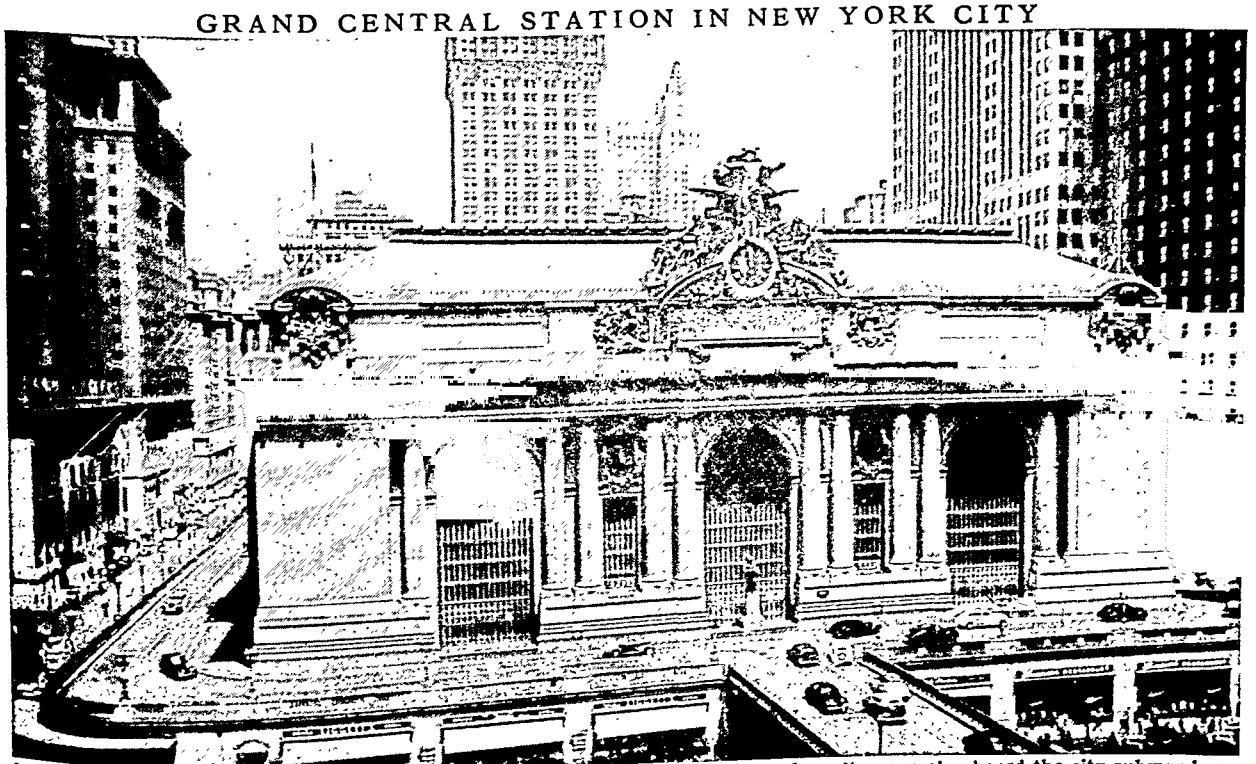
New York's financial and commercial interests are on so enormous a scale that they overshadow its great manufacturing industries. But almost 10 per cent of the manufactured goods of the nation are produced in New York City. It is but a short distance from the coal and oil of the Appalachian fields. It has been further aided by the large supply of immigrant labor, which was a great factor in giving it the lead in manufacturing wearing apparel. Almost half the clothing worn in the country is made in the workshops of New York City.

The printing and publishing industry is largely concentrated here, ranking second to clothing in value. Other leading manufactures are bakery products, meat packing, foundry and machine shop products, sugar refining, millinery, leather goods, shoes, tobacco manufactures, furniture, and paint and varnish.

Early History

The Dutch West India Company occupied the site of New York with a fur trading post in 1614, five years after Henry Hudson's voyage up the river. After the Dutch had secured permission from the Indians to settle on Manhattan Island for the equivalent of $24, they named the island New Amsterdam. The early history of the city, from the days of Peter Stuyvesant to the start of the Revolution, is practically the history of the state. (*See* New York.)

GRAND CENTRAL STATION IN NEW YORK CITY



In this railroad station you can watch the coming and going of 525 trains every day. You can also board the city subway here, eat in one of 17 restaurants, buy clothing, jewelry, and toys, have your hair cut and your clothes cleaned, and receive hospital treatment. Underneath the station lie two levels of tracks and below those, the power plant.

CROWDS GOING HOME



The subways are a New Yorker's chief means of travel. During every morning and evening rush hour literally millions crowd the subway platforms. As a train stops they surge forward to board trains already nearly full. Somehow all of them get on.

New York City was prominent in the movement which led to the American Revolution. The Stamp Act Congress (1765) met here. Organizations of Sons of Liberty used violence to oppose the sale of stamps and later the shipments of unfairly taxed tea. The city was occupied by the British during the whole of the war. It was the chief refuge for Loyalists. Before the Revolution, New York City had been outranked in commerce by both Boston and Philadelphia; but after the British evacuation (Nov. 25, 1783) New York forged rapidly to the front. Trade with China was begun, and by 1788 a hundred vessels or more might be seen in port at any one time. The opening of the Erie Canal in 1825 gave new life to the westward movement of merchandise and ensured New York City's commercial supremacy. A great fire, starting on December 16 and raging until Dec. 19, 1835, destroyed the entire East Side below Wall Street.

New York City was the capital of the colony and state until 1797, and from 1789 to 1790 it was also the capital of the nation. During the Civil War disloyal mobs rioted against the draft, but the city sent large numbers of its native and foreign-born men to swell the Union ranks. Between 1863 and 1871 the "Tweed Ring," through Tammany Hall's notorious political machine, plundered the city until the power of the ring was broken. Its boss, William M. Tweed, was sent to prison.

A World's Fair was held in 1939 and 1940. In 1946 the United Nations voted to make New York City its permanent capital. John D. Rockefeller, Jr., donated six blocks along the East River in Manhattan and the city itself gave several small additional tracts as a site for the capital.

New York City's Government

New York City is ruled by a complex structure of city, county, and borough governments. The authority of these units sometimes overlaps. The city's budget is more than a billion dollars a year. In the United States this is exceeded only by the budget of the national government. The complexity of government structure is due in part to the way the city grew. Its limits now take in five separate counties. Each county contains a borough, and each borough and each county has a separate government organization.

In 1874 New York City took within its borders all Manhattan Island, comprising New York County. It absorbed the present Bronx County in 1895. In 1897, under the Greater New York charter, it took in two Long Island counties, Kings and Queens, and Richmond County (all Staten Island). New York County is the borough of Manhattan. Kings County is the borough of Brooklyn. The other three boroughs carry the same names as their counties.

A new city charter, adopted in November 1936, became effective Jan. 1, 1938. Under the provisions of this charter, each borough elects a president and members of an improvement board. The presidents and boards have limited authority, principally over street and sewer repairs within the borough. Through many departments the city government controls such other municipal affairs as schools, parks, health, fire and police protection, housing conditions, and the construction of public works.

The city's chief executive is a mayor, elected for a four-year term. He is assisted by a deputy mayor. Since 1947 the law-making powers have been exercised by a City Council, headed by a president. The president and another city officer called a comptroller (a sort of auditor) are elected by a city-wide vote. One councilman is elected from each of the 25 state senatorial districts within the city.

The most powerful governmental body is the Board of Estimate. It is made up of the mayor, the five borough presidents, the president of the City Council, and the comptroller. The Board of Estimate frames the budget. This must be approved by the City Council, but changes can be vetoed by the mayor. Another important city body is the Planning Commission, which makes long-range plans for city development. Its members are appointed by the mayor for overlapping terms of eight years.

New York City has two other authorities with special responsibilities. These are the New York City Housing Authority and the Triborough Bridge and Tunnel Authority. There is also a city-owned radio station, WNYC, providing various public services.

The 12 members of the bi-state Port of New York Authority are appointed (six each) by the governors of New York and New Jersey. This authority controls the New York Harbor, several tunnels and bridges, some truck, bus, and rail freight terminal facilities, and several airports. The Port of New York Authority is a model for all such authorities in this country.

NEW ZEALAND—
"*the* HAPPY ISLES"



Snow-capped Mount Egmont, an extinct volcano, rises from an almost tropical plain. The tree fern that frames this view has fronds 15 feet long.

NEW ZEALAND "Last, loveliest, loneliest, exquisite, apart . . . the happy isles." So Rudyard Kipling described New Zealand. Many travelers think the country is the most beautiful on earth. Sportsmen find it a paradise for hunting, fishing, and skiing.

New Zealand was settled by British people and it is still very British. Like Canada, it is a self-governing member of the British Commonwealth of Nations. The official name of the country is Dominion of New Zealand.

A Long, Mountainous Island Chain

Vast stretches of the South Pacific Ocean surround New Zealand on all sides. Australia, its nearest big neighbor, is 1,470 miles westward across the Tasman Sea. San Francisco is about 6,300 miles to the northeast.

The country is a little smaller than Colorado. It consists of North Island, South Island, Stewart Island, and the Chatham Islands. The island chain is so long that if it were moved to the east coast of North America it would extend from the mouth of the St. Lawrence River to North Carolina. It is so narrow that no point is more than 80 miles from the sea. The interior is mountainous. The widest plains and all the principal cities are on the east coasts of the two main islands. There are only about 16 people to the square mile.

Because New Zealand lies south of the equator, the warmest part of the country is in the north. At the northern tip of North Island stretches an almost tropical beach 60 miles long. In the center of this island, volcanic mountains rise from a high plateau. A few are still active. In the "thermal district" around Rotorua, geysers spout, mud pools boil, and hot rivers flow. A fish caught in a cold stream can be cooked in a hot stream nearby. At Waitomo are vast underground caves, dimly lit by myriads of glowworms. On the west coast rises beautiful Mount Egmont (8,260 feet), an almost perfect volcanic cone.

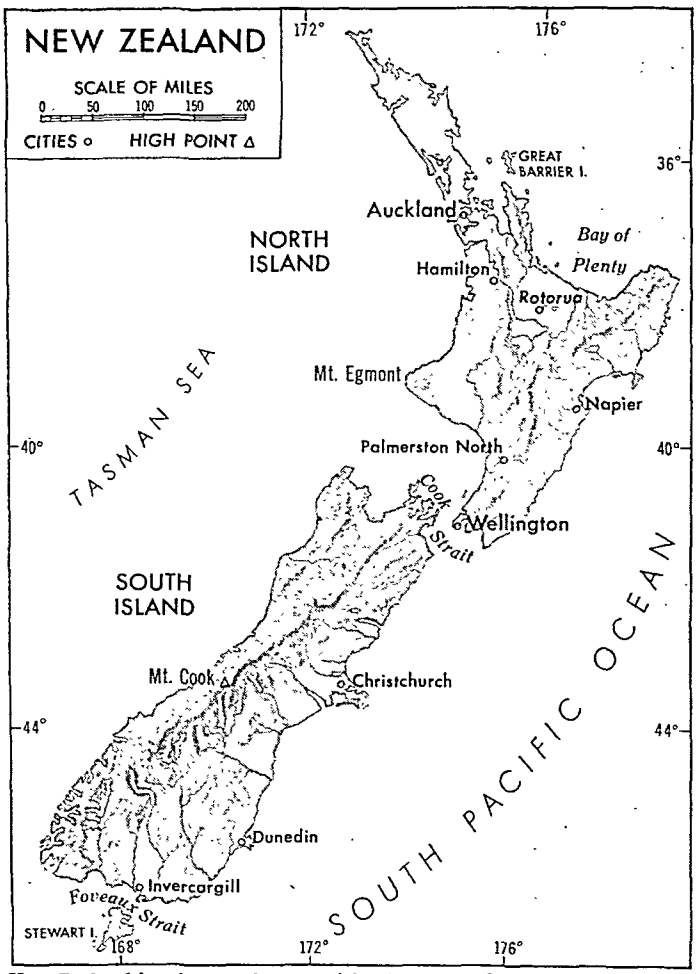
Extent.—North to south, 1,100 miles. Area of New Zealand proper, 103,416 sq. mi., including North Island (44,281 sq. mi.), South Island (58,093 sq. mi.), Stewart Island (670 sq. mi.), and Chatham Islands (372 sq. mi.). Population (1951 census), 1,939,472.
Territories.—Kermadec Islands, Cook Islands, Niue Islands, Tokelau Islands, Auckland Islands, and other outlying island groups. Ross Dependency, in Antarctica. Administers Western Samoa as a trusteeship and shares in trusteeship of Nauru.
Chief Products.—Butter, cheese, meat (lamb, mutton, beef), wheat, wool; gold, coal; clothing, furniture.
Cities (pop. includes suburbs).—Auckland (329,193); Christchurch (174,221); Wellington (133,414); Dunedin (95,457).

Even more beautiful is South Island, which has higher mountains but no volcanoes. In the Southern Alps are many peaks above 10,000 feet that are ice-capped throughout the year. Near the west coast Mount Cook, New Zealand's highest peak, rises to 12,349 feet. Down its sides glaciers reach like giant fingers almost to the sea. The southwest coast is pierced by fiords as majestic as those of Norway. Near the head of one fiord, a superb waterfall, Sutherland Falls, plunges down 1,904 feet.

Ocean winds give New Zealand a cool moist climate with little change from summer to winter. The seasons are the reverse of those in the Northern Hemisphere. In July, the coldest month, 40° F. is considered uncomfortably low. In the warmest months—January and February—75° F. is thought unpleasantly high. Because the prevailing wind is from the west, the west coast has the heaviest rainfall—up to 250 inches a year in parts of the Southern Alps. Mountain areas are dotted with lakes, and all around the coast short rivers tumble to the sea. Waterfalls and rivers supply New Zealand with abundant hydroelectric power.

Native Plants and Animals

Lumbermen have cut down much of New Zealand's virgin timber, but there are still rich forests in many parts of the country. Most famous of the native trees is the giant kauri pine. The pohutukawa is called



New Zealand is a long and narrow island country about halfway between the equator and the South Pole. Cook Strait, which separates the two main islands, is 16 miles wide at its narrowest point.

New Zealand's Christmas tree because in December it is covered with flaming red flowers. The kowhai has golden yellow flowers hanging in clusters from brown branches. Tree ferns grow as high as 50 feet.

When New Zealand was discovered, it had many strange birds and no native mammals. The flightless moa, about 12 feet tall and now extinct, was a sort of giraffe of the bird world. The kiwi, another flightless bird, still survives and has become the emblem animal of New Zealand. (New Zealand soldiers are called kiwis.) It is larger than a big hen, has a long beak, no tail, and only a trace of wings. The colorful tui and the bellbird keep the forests alive with their song. The lizardlike tuatara has a third eye in the center of its forehead. It is the sole survivor of a class of prehistoric reptiles.

The early settlers imported animals from Europe and America. Some pigs escaped, and their descendants are now wild boars that are dangerous if attacked. Deer and rabbits multiplied rapidly and are now pests because they eat valuable pasture.

The Maoris, New Zealand's Native People

Centuries before Europeans discovered New Zealand Polynesians had crossed the Pacific in canoes and settled the islands. They are tall, handsome, brown-skinned people, friendly and poetic. They call themselves *Maoris* ("ordinary folk") to distinguish themselves from the *Pakeha* ("white") New Zealanders. They now number about 100,000.

Most of the Maoris live on farms around the thermal district of Rotorua. They have accepted Christianity, but in some of their churches they blend Christian teaching with ancient Maori religious practices. They are deeply attached to their tribal groups. Each tribe is named for one of the canoes of the first Maori settlers. The tribe's members gather in a beautifully carved meeting house to deal with tribal affairs. Then they sing traditional songs and perform ancient dances—the Haka, or war dance, by the men and the Poi dance by the girls. Many of the young people now leave their tribes to work in the cities.

A Prosperous Modern Nation

The white people are almost all of British origin and more than one third of them live in the four main cities. The largest city is Auckland, on the northern peninsula. Situated on a beautiful natural harbor, it is a busy port and an international air terminal. Wellington, the capital, has a fine harbor on the southern tip of North Island. It is the chief port for commerce between the two main islands. South Island's principal cities are Christchurch, a typical English town, and Dunedin. Dunedin was settled chiefly by Scots and resembles Edinburgh both in appearance and climate. The country is well served by roads and railways, although both have required the construction of thousands of bridges.

The typical house, whether in town or country, is a one-story bungalow or ranch house, built of wood, with corrugated iron roofing. Nearly every house has a garden with glorious flowers; and the "bush" (country) is always near enough for a family picnic. Golf, tennis, cricket, football, fishing, swimming, and horse racing are all popular sports.

The four main churches are the Church of England, Presbyterian, Roman Catholic, and Methodist. Schools are free up to the age of 19. Attendance is compulsory up to the age of 15 for Maori and white children alike. Each of the four main cities has a university college. Together they form the University of New Zealand, which grants degrees.

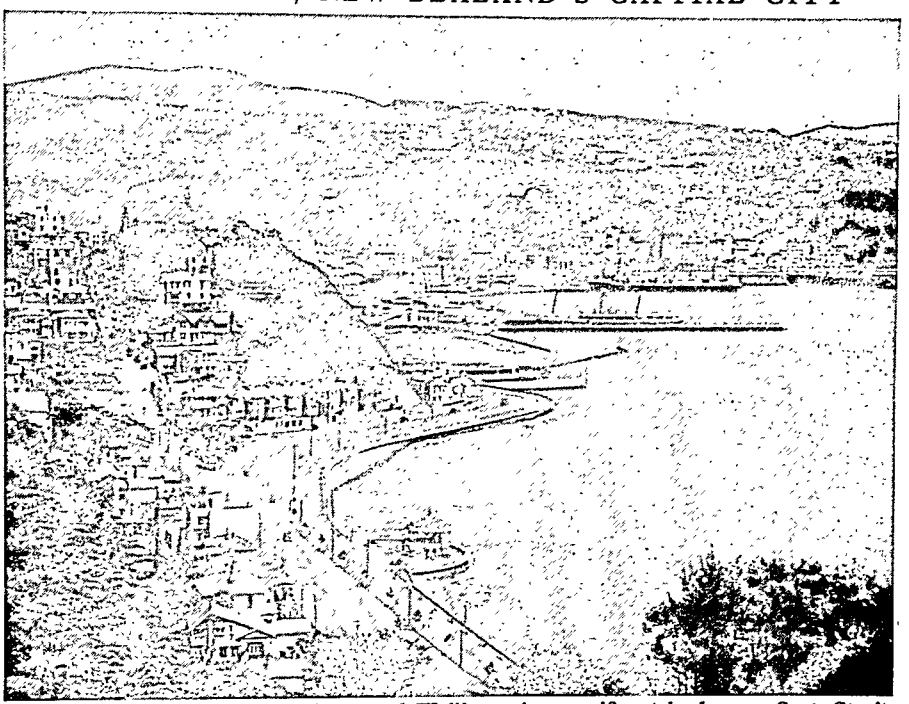
New Zealand gets its living chiefly from cattle and sheep. The soil is nowhere very fertile, but abundant rain produces rich pastures, and the climate is warm enough for stock to remain outdoors throughout the year. In general, sheep predominate in the hilly districts. Dairy cattle are raised on the west coast lowlands, which have abundant rain; and beef cattle, on the drier eastern plains. Stock raising is a scientific business. Sheep have been crossbred to produce both good meat and good wool. Dairy farms are like

milk factories. Practically all have electricity.

The best section for crops is the long Canterbury Plain around Christchurch. Here wheat is the chief crop. Citrus fruits are grown in the warm Auckland peninsula. Other districts near the sea specialize in apples, apricots, grapes, or pears.

New Zealand is poor in minerals. Gold production, once important, has declined. Coal is the leading mineral, but supplies are limited and New Zealand must import some from Australia. Manufacturing is handicapped by lack of raw materials and by the small market, which limits the size of factories. The chief industries are making butter, cheese, and condensed milk, freezing lamb and mutton, and freezing or chilling beef. Small factories supply the home market with vehicles, lumber, clothing, and furniture. New Zealand exports dairy products, meat, and wool, chiefly to Great Britain. It imports metals, machinery, petroleum, textiles, and clothing.

WELLINGTON, NEW ZEALAND'S CAPITAL CITY



Residences spread over the hills around Wellington's magnificent harbor on Cook Strait. The crowded business section, built on reclaimed land, lines the farther shore. Wellington is the chief port for commerce between the islands.

How New Zealand Is Governed

The British sovereign is represented in New Zealand by a governor general, but he acts on the advice of the New Zealand government. Parliament consists of a single chamber, the House of Representatives. (The upper house was abolished in 1951.) Members of parliament are elected every three years. Four of the 80 members are chosen by Maoris. The prime minister, leader of the party in power, heads the executive council, or cabinet.

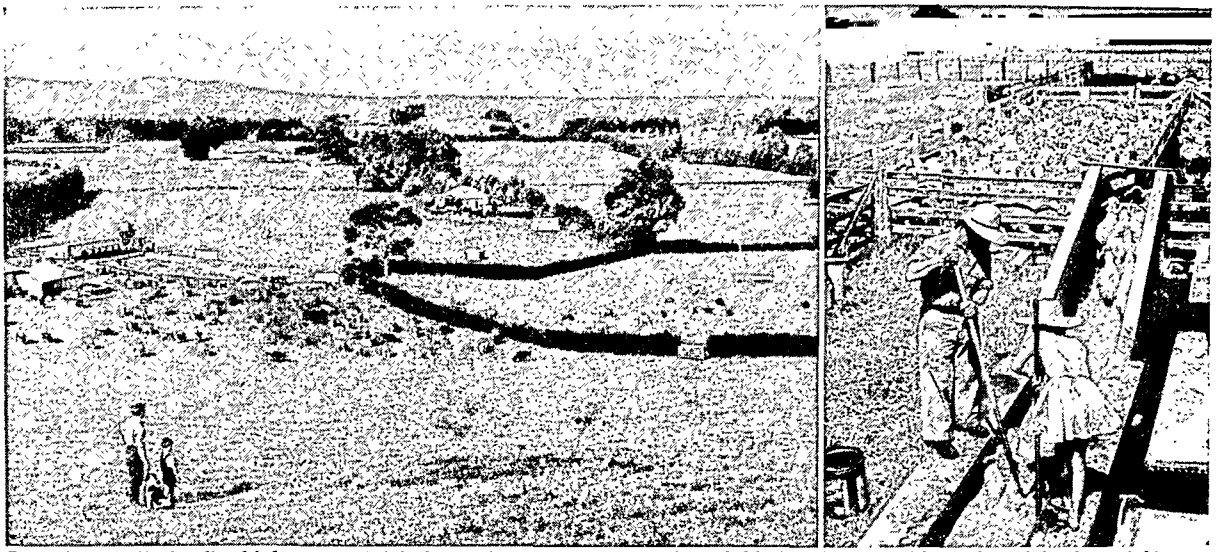
New Zealand pioneered in social security legislation. Its system includes old-age pensions; benefits for widows, orphans, and families; unemployment and sickness benefits; medical and hospital care. Its laws provide for minimum wages, a 40-hour week, and arbitration courts for labor disputes. The government operates hydroelectric plants, the railways, aviation, telegraph and telephone, and the chief radio network. It also engages in banking and housebuilding. The

THE MAORIS STILL PRACTICE THEIR ANCIENT ARTS



The Maoris are skilled in wood carving. A warrior ancestor is represented in this figure at the top of a tribal meeting house (left). The dancers (right) seated in the "canoe" in which their ancestors reached the islands tap out the rhythm of the waves with small "poi" balls. Their skirts are made of beaded flax stems. The leaders wear cloaks decorated with the feathers of rare birds.

THE LAND OF THE COW AND THE SHEEP



Grass is New Zealand's chief crop, and dairying and sheep raising are the chief industries. On this modern dairy farm (left) pastures are fenced in with neat hedgerows. At the right, father and daughter are hard at work dipping sheep to destroy the vermin on their skin and fleece. The sheep swim along a deep and narrow channel and are given a ducking before they reach the end.

state is, therefore, the chief employer of labor. Income taxes on individuals and corporations are heavy.

Discovery and History

A Dutch sea captain, Abel Tasman, discovered New Zealand in 1642, but the hostility of the natives prevented him from going ashore. The Dutch named the islands Nieuw Zeeland after one of the Netherlands provinces. Captain James Cook, an English navigator, explored and mapped the islands in 1769–77.

British colonization was begun in 1840. In the same year, after entering into a treaty with the Maoris, Britain proclaimed New Zealand a British crown colony. A constitutional form of government was established in 1852. Conflicts with the Maoris over land ownership brought on a fierce war in 1860 and slowed up settlement of North Island. On South Island, the discovery of gold in 1861 brought a rush of settlers.

New Zealand became a dominion of the British Commonwealth in 1907. During the world-wide depression of the 1930's the Labor party grew strong. It held power from 1935 to 1949 and carried out a far-reaching program of state socialism. In 1949 the more conservative Nationalist party came into office.

New Zealand gave generous support to Great Britain in both world wars. As a member of the United Nations, it joined in the defense of South Korea in 1950. In 1951 the United States signed a mutual defense pact with New Zealand and Australia. (For Reference-Outline and Bibliography, *see* Australia.)

NEY (*nā*), MICHEL (1769–1815). "The bravest of the brave" was the title given by Napoleon to his great marshal, Michel Ney. The son of a cooper, Ney had become an under-officer in a hussar regiment by the beginning of the French Revolution. Promotion came rapidly, and Napoleon made him a marshal when the empire was established in 1804. In the war against Prussia and Russia Ney contributed to the victories at Jena in 1806 and at Friedland in 1807.

GOING TO SCHOOL IN NEW ZEALAND



In this modern school, the children learn by doing. One group is studying a working model of a steam engine. Another group is learning how to shop by playing store. They put vegetables on the scale, mark their weight, and then figure the prices.

But it was in the Russian campaign that his bravery was most conspicuous. On the disastrous retreat from Moscow he protected the rear, encouraged the soldiers, and was himself the last to cross the Russian frontier. When news reached Napoleon that this "Launcelot of the Imperial chivalry" had escaped, he exclaimed to his officers: "I have more than 400,000,000 francs in the cellars of the Tuileries and would gladly have given all to ransom my faithful companion in arms."

But a few years later Napoleon in his far-away prison-island, St. Helena, heard without emotion the news that Ney had been shot as a traitor. The reason for this change of attitude was that when Napoleon had been forced to abdicate, in 1814, Ney had gone over to the royalists with loud protestations of devotion to the Bourbons. When Napoleon had returned from Elba, Ney had set out from Paris, boasting that he would bring this disturber of the peace back "in an iron cage." But when he met his former commander, he and his whole army had joined the force of the enemy, and had fought for Napoleon at Waterloo.

For this he had been condemned to death, and because he had broken his faith both with Louis XVIII and with Napoleon the exiled emperor condemned him as "dishonorable." The legend that Ney escaped to the United States and lived there many years before his death is without any historical authority.

AMERICA'S *Roaring* WATER GIANT



Here are the majestic Niagara Falls. The American Fall is in the foreground and the mist-covered Canadian Horseshoe Fall is in the background.

NIAGARA FALLS. In 1678, Father Louis Hennepin, the Franciscan priest who accompanied La Salle, was the first white man to view the falls of Niagara. In a recent year the falls had an estimated 3,500,000 sight-seers. Among them were many newly married couples who spent their honeymoon at this popular spot about 22 miles northwest of Buffalo, where Lake Erie empties into Lake Ontario. Anthony Trollope, the celebrated English novelist, once wrote that "of all the sights on earth which tourists travel to see," he knew of none "so beautiful, so glorious, and so powerful" as the falls of the Niagara River.

The Mighty Falls

Every minute about 15,000,000 cubic feet, or more than 465,000 tons of water pour in torrents over the precipices of the falls of Niagara. These torrents land about 50 feet beyond the ledge above and drop as much as 167 feet to the turbulent water below.

As the water plunges from the brink of the falls, it fills the air with a silvery mist which under the

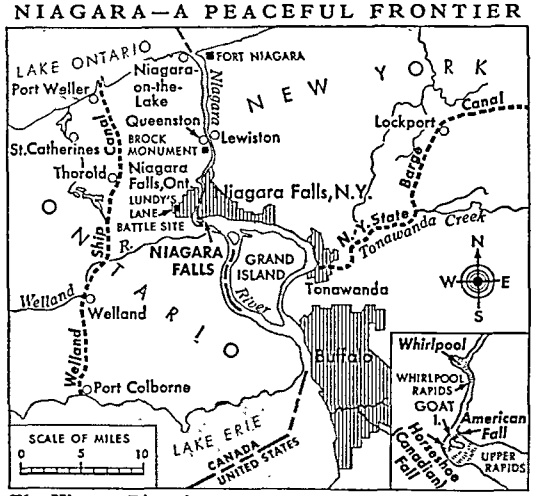
sunlight displays many rainbows. The plunging water also sends out a never-ending roar as it strikes the bottom. For this reason the Iroquois Indians called the cataract Niagara, meaning "thunder of waters." In winter, water near the edges of the falls may freeze into majestic masses of ice.

The falls are divided into two parts by Goat Island. The larger portion, on the southwest side, is the Canadian Fall, also called the Horseshoe Fall. It measures 3,000 feet along its curve and drops about 158 feet. The smaller American Fall is northeast of Goat Island. It is 1,000 feet straight across, and drops about 167 feet.

Just before flowing over the ledge, the American stream is only about 3½ feet deep. The Canadian stream is about 20 feet deep and carries some 95 per cent of the river's water. Thus the Horseshoe is the larger and grander of the two falls.

The plunging water has worn the lower rocks away so that there are caves behind the sheets of water of both falls. Sight-seers may enter these and get unusual views of the falls. The Canadian Fall has carved out a plunge basin 192 feet deep. The basin slows down the flow below the fall, and steamers can go near the cataract here.

NIAGARA—A PEACEFUL FRONTIER



The Niagara River forms a boundary between the United States (right) and Canada (left). Its peace has been undisturbed since the War of 1812 when the battles of Queenston Heights (marked by the Brock Monument) and Lundy's Lane were fought here. Today the undefended frontier gives an outstanding example of peace and coöperation between neighboring nations.

Putting the Water Giant to Work

All the drainage from four of the Great Lakes pours over the crest of Niagara. Only about one fourth of this tremendous volume of falling water is used to generate electric power in hydroelectric plants. They develop a maximum of about 1¾ million horsepower, some two thirds of this on the Canadian side and one third on the American side. The plants draw water from the river above the falls, through canals. Near each plant, the water drops through penstocks to powerhouses below the falls. There it turns great turbine generators (*see* Turbine).

Control of Niagara Falls has long offered the world a fine example of international coöperation. A treaty of 1910 and later agreements fixed the amounts of water that could be diverted to hydroelectric plants. To supervise diversion of water, an international Niagara Control Board was set up in 1923. In 1950 the two countries made a new treaty which specified the minimum flow, depending upon season and time of day, to be maintained over the falls. This treaty opened the way to greater hydroelectric development of the falls.

In treaties and agreements the United States and Canada have always been careful to preserve the beauty of the great cataract. In 1943 the two governments built a submerged weir to direct a greater proportion of water over the American Fall.

How Niagara Came to Be

Geologists say that the falls of Niagara are about 25,000 years old. But the hard rock (called Lockport dolomite) at the brink of the falls is much older. It was made on the bed of an inland sea more than 300 million years ago, in Silurian times (*see* Geology). Gradually the limy sediment hardened to stone—either pure limestone or dolomite, a limestone with magnesium.

In a later age, the Niagara region was involved in a widespread uplift of land, about a basin centered in the state of Michigan. Rain and streams wore down most of the uplifted land. But the layer of tough limestone and dolomite resisted erosion; and the edge of the deposit formed a great cliff, called the Niagara escarpment. It runs westward from Rochester, N.Y., between Lakes Erie and Ontario, and then swings north through the province of Ontario. Everywhere it is capped by hard Niagara limestone or Lockport dolomite.

Many ages later, glaciers covered the Niagara region (*see* Ice Age). As the last glacier retreated northward, it left Lake Erie at its southern edge. Water from the lake began to spill over the Niagara escarpment into the Ontario basin below, just south of where Queenston and Lewiston now stand.

The new fall did not wear away the dolomite cap rock as fast as it churned away the softer rock below. From time to time, blocks of the undermined cap rock would break off. In this way the fall worked back toward Lake Erie, forming a steep-walled gorge as it went. The process is still going on. On the average the undermining process moves the American Fall southward from two to seven inches a year and the Horseshoe Fall from two to five feet. (For a diagram of the undercutting process, *see* Earth.)

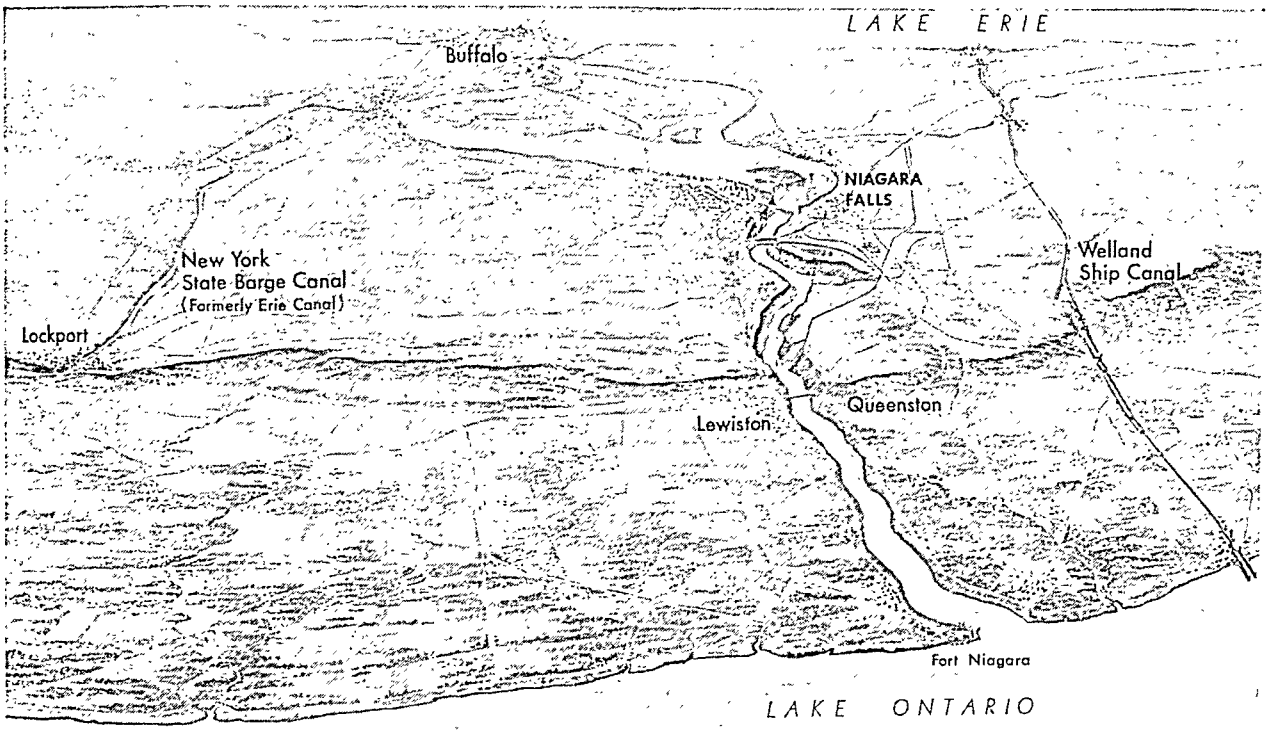
Niagara's rate of cutting has changed many times. It started slowly, for at first the river drained Lake Erie only. Superior, Michigan, and Huron used a more northerly outlet. But the drainage changed as the glaciers retreated, and at length water from all four lakes poured over the falls. This speeded up cutting.

When the falls reached the point where the Whirlpool now is, they reached an ancient valley cut into the dolomite from the west and later filled with glacial debris. The river gouged out the soft material, forming the whirlpool basin.

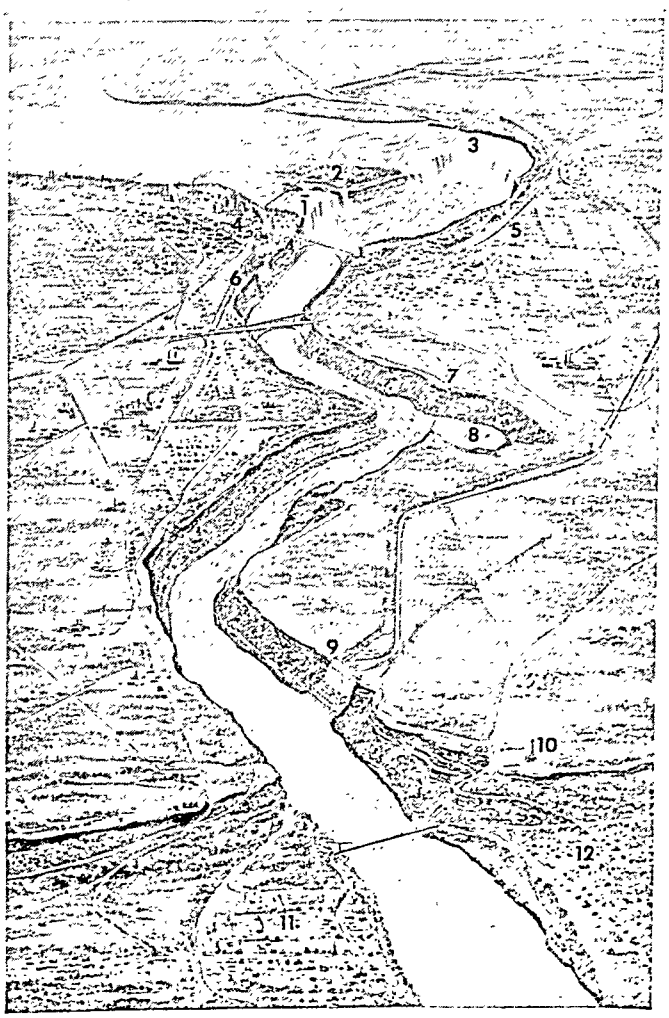
From Stunts to Public Parks

The fascination of Niagara has prompted adventurers to perform foolhardy acts. One of the first was

WHERE NIAGARA HAS CARVED ITS GORGE



The picture above shows the Niagara peninsula as seen looking south from above Lake Ontario. The view extends from Lockport on the New York State Barge Canal (left) to beyond the Welland Ship Canal (right). Water flows from Lake Erie, far away to the south, over the falls in the middle distance. The Niagara escarpment may be seen in the foreground.



The close-up view (right) of Niagara Falls and the gorge shows outstanding places of interest. They are (1) the American Fall; (2) Goat Island; (3) the Canadian (Horseshoe) Fall; (4) the city of Niagara Falls, N.Y.; (5) Niagara Falls, Ont.; (6) the American powerhouse; (7) aerial cableway; (8) the Whirlpool; (9) the Canadian powerhouse; (10) the Brock Monument; (11) Lewiston; (12) Queenston.

the French acrobat, Charles Blondin, who walked across the gorge on a tightrope in 1859. Some have gone over the falls in barrels or other containers. Others have tried to swim the rapids. All such hazardous stunts are now prohibited by law.

For years both the American and Canadian governments have worked to improve the falls area. For the enjoyment of visitors they have built overlooks and connected them with foot paths and highways. At night colored lights illuminate the falls and rapids. Both governments maintain public parks near by (*see* New York State).

NIAGARA FALLS, N. Y. Water power helped build the city of Niagara Falls and today it turns the wheels of its many factories. The city is located at the main falls of the Niagara River. The falling water here provides a great and constant source of power for hydroelectric plants which supply the city and a large surrounding area (*see* Niagara Falls).

Abundant and cheap electric power has made Niagara Falls one of the largest electrochemical and electrometallurgical centers in the world. The city manufactures abrasives, carbon, graphite, aluminum, bronze, iron alloys, and various chemicals.

The main tourist attraction is Niagara Falls, with its gorge and upper and lower falls. In the city itself is Hyde Park, a municipal recreation area of 382 acres. The Rainbow Bridge, the Whirlpool Rapids Bridge, and a railroad bridge link the community with Niagara Falls, Ontario, across the river.

A fort called Little Niagara was built in 1745 and rebuilt in 1751 on the present site of Niagara Falls, N.Y. Here Augustus Porter founded the village of Manchester in 1806. It was burned by the British in 1813. The village remained small until a canal to supply water power was built around the falls between 1852 and 1862.

Electricity from the village's first hydroelectric plant was used for park lighting beginning in 1879 and for commercial purposes starting in 1881. In 1892 the villages of Manchester and Suspension Bridge were combined as the city of Niagara Falls, N. Y. Population (1950 census), 90,872.

NIBELUNGS (*nē'bĕ-lụngs*), **SONG OF THE.** In the Middle Ages the minstrels of northern Europe roamed from castle to castle entertaining the people with song and story. One of their favorite themes was the long series of heroic deeds and tragic events centering around the treasure of the Nibelungs, a mythical race of Scandinavian dwarfs. These tales at last took written form in German as the Nibelungenlied, or Song of the Nibelungs, and in a Scandinavian version known as the Volsunga Saga. From them Wagner took the stories of his Ring cycle of operas (*see* Opera; Wagner).

The story of the evil treasure begins when three gods, Odin, Loki, and Hoenir, saw an otter devouring a salmon. They killed the otter and bearing the pelt with them sought shelter for the night in the abode of Rodmar, a greedy heartless miser. Rodmar recognized the pelt as being that of one of his sons, who had the power of changing his shape. He demanded as pay (wergeld) for the slaying of his son enough gold to completely cover the otter pelt. To get the gold the gods hastened to the river and seized a priceless treasure which was guarded by a giant fish, but when all was heaped upon the pelt one hair remained uncovered. Yielding to Rodmar's demand, Loki placed on this a ring which bore this curse: "Evil shall come to him who wears it." This treasure passed after a time into the hands of the Nibelung kings and played its tragic part in the Nibelungenlied.

In the Song of the Nibelungs this hoard is found in the possession of Siegfried, a daring warrior, who has slain the two kings of the Nibelungs to obtain it. Little mention is made of the curse, and the story deals chiefly with the adventures and loves of humans, the gods having altogether disappeared from the scene. The plot centers around Kriemhild, the beautiful sister of Gunther, king of the Burgundians, who holds his court at Worms, on the middle Rhine. Siegfried comes to Worms to woo Kriemhild, and in due course they are wedded.

Many characters are introduced into the story. One is Brunhild, an Icelandic princess of wonderful beauty and warlike strength. Only he who should overcome her in deeds of skill and strength might win her love and hand. King Gunther, attracted by the fame of her beauty, goes to woo her, and Siegfried accompanies him as his friend and ally. Wearing a cloak of darkness which makes him invisible, Siegfried aids Gunther in defeating Brunhild in three tests of prowess—hurling for him the spear, putting the weight, and jumping with Gunther in his arms far beyond the limit that Brunhild could reach.

Gunther weds Brunhild, and she goes to live in the court at Worms. Later she learns of the deception and that it was Siegfried and not Gunther who was worthy of her hand. Soon after, Siegfried is treacherously slain by one of Gunther's followers; and Brunhild slays herself with his sword. Kriemhild vows vengeance on her brother, for she knows that he is really responsible for her lord Siegfried's death. She marries Etzel (Attila), king of the Huns, and after many years invites Gunther to visit the kingdom. He comes bringing his followers but is met by a powerful army and overcome. Gunther is put to death and Siegfried is avenged.

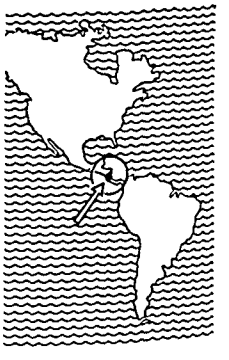
The treasure again enters the story at this point. Kriemhild demands from Hagen, a vassal of Gunther and the slayer of Siegfried, the hiding place of the hoard. He refuses to impart it, saying—

> None knoweth of the treasure save God and me alone:
> And unto thee, she-devil, it never shall be known.

Enraged, Kriemhild grasps Siegfried's sword and decapitates Hagen but is herself slain by a follower of Etzel.

The story is thus filled with tragedy. This perhaps is due to that element in the story which was known to the earlier versions but forgotten in the later—the curse of the Nibelung hoard which falls upon all who possess it.

NICARA'GUA. One of the largest Central American republics is Nicaragua (area, 57,145 square miles). It is shaped like a triangle. It adjoins Honduras on the north, the Caribbean Sea on the east, and the Pacific Ocean and Costa Rica on the southwest and south.



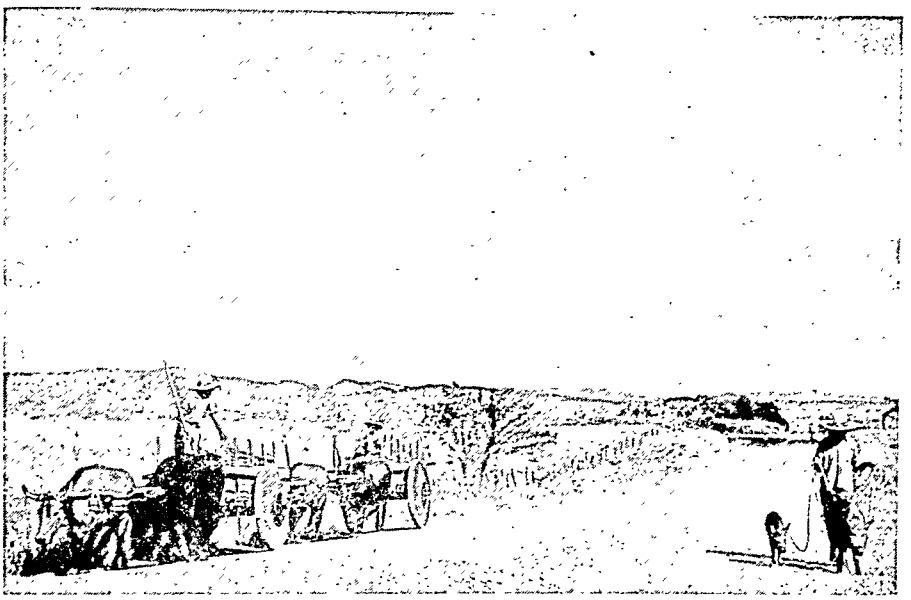
There are two ranges of volcanic mountains. One stretches along the northern border. The other separates the Pacific from Lakes Nicaragua and Managua. Lake Nicaragua is 100 miles long. In the Lake Managua region is the mile-high volcano Momotombo.

Nicaragua is divided into three natural regions—the western, the central, and the eastern. About three fourths of the people live in the high western region of lakes and mountains. The temperature ranges from 40°F. to 95°. There are two seasons—wet and dry. About 60 inches of rain falls in the wet

season from May to December. The volcanic soil is rich and the region has the best farm land in the country. Corn, rice, coffee, sugar, cotton, cacao, and beans grow on the mountain slopes and in the valleys.

East of the mountains is a sparsely populated plateau. About 120 inches of rain falls here each year. In the north the hills are covered with forests of pine and oak. Forestry and mining are the chief occupations. Grasslands in the south support ranching.

The east coast is low, hot, and swampy; and it has many rivers that empty into the Caribbean Sea. The coast may have as much as 300 inches of rain in a year. This region grows many bananas.



THE PAN AMERICAN HIGHWAY IN NICARAGUA

Teams of oxen are pulling wagons along Nicaragua's section of the Pan American Highway. Much of the highway in Central America has a gravel surface.

Although Nicaragua is an agricultural nation, almost one third of the people live in cities. Most of the cities are in the western lake region. The capital, Managua (109,352), lies at the foot of Momotombo, on the south shore of Lake Managua. In 1931 Managua was destroyed by an earthquake. Other important cities are Léon, Granada, Corinto (the largest Pacific port), and the Atlantic ports of Bluefields and Cabezas. The chief exports are coffee, gold, cotton, bananas, cacao, sugar, rubber, lumber, and hides.

Nicaragua's lakes and rivers are used for most of the local transportation. A railroad connects interior cities with the port of Corinto. Except for the Pan American Highway there are few good roads. Managua has an international airport. The United States has considered building a canal across Nicaragua in case an enemy might destroy the one in Panama.

Spain ruled Nicaragua from early in the 16th century until the country became independent in 1821. In the next century civil war ravaged the country. Between 1912 and 1933 United States Marines were sent to protect United States interests. In 1954–55 there were border disputes with Guatemala and Costa Rica that brought intervention from the Organization of American States. (*See also* Central America.) Population (1950 census), 1,057,023.

NICE (*nēs*), **France.** On the Mediterranean coast of France, at the western end of a crescent-shaped area called the Riviera, is the city of Nice. The Riviera lies between the Maritime Alps and the Gulf of Genoa. The mountains protect the coast from the north winds, and the climate is sunny and warm like that of southern California. There are olive groves and lush gardens. Dates, bananas, and oranges are grown.

Many people come to Nice each year to rest in the sunshine, play in the Casino, and take part in the brilliant carnival held before Lent. Nice is divided into three parts: the New Town, the Old Town, and the Port. The medieval Old Town lies close to the seashore. To the north is the New Town, with modern theaters, hotels, casinos, and villas. East of the Old Town is the commercial center and port. Nice has a cathedral, a museum, a library, and a monument to Garibaldi, who was born there in 1807.

Nice was settled about 2,000 years ago by Greeks from Marseilles. When the Greeks conquered a neighboring tribe, they named their city Nice (from the Greek *Nike*, meaning "victory"). Later the city fell under Roman and then Turkish rule. In the following centuries it was controlled at different times by Provence, Savoy, and Sardinia-Piedmont. Italy ceded Nice to France as a reward for French aid in creating a united Italy.

Nice's main export is olive oil. Soap, perfumes, leather, and furniture are other important products. Population (1946 census), 206,750.

NICHOLAS, Emperors (Czars) of Russia. Two of Russia's Romanov rulers were named Nicholas. Nicholas II was the last emperor.

NICHOLAS I (born 1796, ruled 1825–1855) was a grandson of Catherine the Great. His father was Paul I. Because he had two older brothers, Alexander and Constantine, it was thought he would never be emperor. Constantine abdicated his right to the throne in 1822. Then Alexander supposedly died in 1825. There is a persistent legend that he was tired of ruling and lived on for many years as a hermit monk in Siberia. He had no son to succeed him. (*See also* Alexander I.)

Nicholas thus succeeded Alexander and immediately trouble began. There was unrest in the army, and the St. Petersburg regiments revolted in what was called the Decembrist uprising. They demanded a constitu-



RUSSIA'S LAST IMPERIAL FAMILY
This picture of Nicholas II and his family was taken shortly before the revolution. The boy, Alexis, sits at his father's feet.

tion. Nicholas crushed the revolt. He then established an elaborate secret police system throughout the Russian empire.

The 30 years of Nicholas' reign saw three wars. In 1828–29 Russia fought against Turkey. Russian armies helped crush a Hungarian revolt against Austria in 1849. Nicholas died during the Crimean War (1854–56). He was succeeded by his son Alexander II. (*See* Russia; Turkey; Hungary; Crimean War; Alexander II.)

NICHOLAS II (born 1868, ruled 1894–1917) was a great-grandson of Nicholas I and the oldest son of Alexander III. His mother, a Danish princess, was a sister of Queen Alexandra of England, wife of Edward VII.

Nicholas had great charm but was hopelessly weak as the all-powerful head of the Russian state. He was greatly influenced by his wife Alexandra Feodorovna. She was the former Princess Alix of Hesse-Darmstadt, a granddaughter of Queen Victoria.

The imperial couple fell under the spell of an evil Siberian monk named Rasputin. Alexis, their only son and heir to the throne, had hemophilia, a blood disease. For some reason, when the boy began to bleed, only Rasputin seemed able to stop it. Nicholas and Alexandra thus came to believe that Alexis' life depended upon Rasputin. The monk gained great political power and offended many of the nobles.

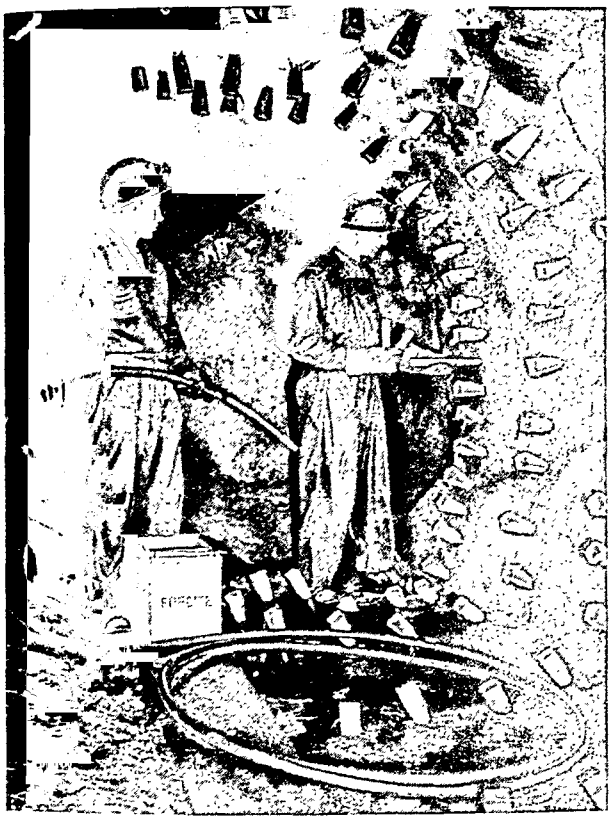
Nicholas, trying to keep peace, called the Hague Conferences of 1899 and 1907 (*see* Hague Peace Conferences). In spite of his efforts, a powerful military bureaucracy managed to fling Russia into a disastrous war (1904–5) with Japan (*see* Russo-Japanese War). The war was followed by widespread revolutionary movements. Nicholas called for the election of a Duma (legislative assembly) as a step toward constitutional government (*see* Russia, *subhead* "The First Duma Is Convened"). The Duma was not a success and public discontent grew, particularly in the cities. The discouraged emperor withdrew almost completely from public life. Rasputin continued to meddle with government affairs until he was assassinated.

In the summer of 1914, Russia and the other great European powers were catapulted into World War I (*see* World War, First). War again proved a disaster for the imperial government. There were corruption at home and defeat on the war fronts. The storm broke in 1917. Troops in St. Petersburg attacked and looted the Winter Palace. The emperor abdicated both for himself and the sickly Alexis, leaving the throne to his brother Michael, who disappeared during the uprisings and was never heard of again. The imperial family was kept under guard until they were finally sent to Siberia. There, on July 17, 1918, in the town of Ekaterinburg, Nicholas, Alexandra, and their five children were brutally murdered by the Soviets.

NICKEL. This metal got its name from a German word for imp, because of the trouble it gave chemists in early times. Today nickel is one of our most useful metals. It is silvery, lustrous, hard, malleable, and magnetic. Pure nickel is seen only in coatings (nickel plate) on other metals, where it is used to embellish them, to protect them from rust or tarnish, or to give them a better wearing surface, as in the case of quality printing plates. The coat is applied by electroplating (*see* Electroplating). Alloyed with copper, nickel is widely used in coins. Alloyed with three parts of copper and one of zinc, nickel forms a metal known as "German silver," used to make tableware and as a base for silver-plated ware.

These uses, however, are comparatively unimportant. Most nickel goes into the manufacture of nickel steel, an alloy adapted to withstand strains. It is used in armor plate, cannon, structural work, bridges, railroad rails, rivets, locomotive boilers, engine forgings, trailer frames, dipper teeth of steam shovels, and automobile gears, shafts, and axles.

A nickel steel called *Invar*, containing 36 per cent nickel, is used for measuring implements and pendulums. It is practically nonexpansive within ordinary temperature variations. Another nickel steel called *platinite* expands at almost the same rate as glass. It is used for the connecting wires in electric light bulbs.



BLASTING FOR CANADIAN NICKEL
These miners are inserting explosive charges into the wall of a nickel mine in the Sudbury district in Ontario, Canada.

Nickel forms many other alloys. Copper-nickel alloys are used for bullet jackets and boiler tubes. Nickel-chromium steel is used for automobile forgings and gears and for armor plate. Electrical-resistance wire in electric appliances is usually an alloy of nickel with other metals—iron, chromium, or copper.

Monel metal is a "natural" alloy of nickel and copper, made by reducing certain ores which contain both these metals. This tough, lustrous, corrosion-resisting alloy is used for food-handling equipment, valves, turbine blades, propellers, wire filter cloth, and many other purposes. (*See* Alloys.)

Nickel oxide is used in Edison storage batteries, in glassmaking, and in pottery glazes. The salts are employed in electroplating and in hardening oils for making soap and oleomargarine. Nickel resists the action of most acids except nitric acid.

Most of the world's nickel comes from the Sudbury district of Ontario, where the principal ore is pentlandite, an iron-nickel sulfide. New Caledonia is the only other important producer.

NICKNAMES. "Nicknames and whippings," said Walter Savage Landor, "when they are once laid on, no one has discovered how to take off." Nations, like persons, have nicknames which grow up in curious ways and become fixed. The nickname Uncle Sam is applied to the United States. During the War of 1812, someone asked why "U. S." was stamped on government goods. He was told that the letters stood for Uncle Sam, the local title for Samuel Wilson, the government inspector. This jest was repeated throughout the country. The name stuck, and Uncle Sam came to personify the United States government and the American people.

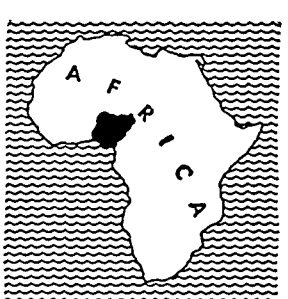
This nickname became even more popular than the earlier one, Brother Jonathan. The original of the name Brother Jonathan, according to the story, was Washington's friend, Gov. Jonathan Trumbull of Connecticut. When perplexed by the need of arms and war material, General Washington would say, "We must consult Brother Jonathan." This expression, being often repeated, came into common use and at last was extended to the American nation as a whole. Brother Jonathan, like Uncle Sam, is always portrayed as a tall thin man with long narrow beard, long-tailed coat, high hat, and a shrewd but humorous, countenance—attributes which marked the typical American of the early days.

Very different is John Bull, the personification of the English nation, who is represented as a stout, ruddy-faced, matter-of-fact, blunt fellow attired in leather breeches and top boots, generally with a cudgel in his hand and a bulldog at his heels. The name John Bull was first used in a political satire published by Dr. Arbuthnot at the time of the War of the Spanish Succession, in Queen Anne's reign.

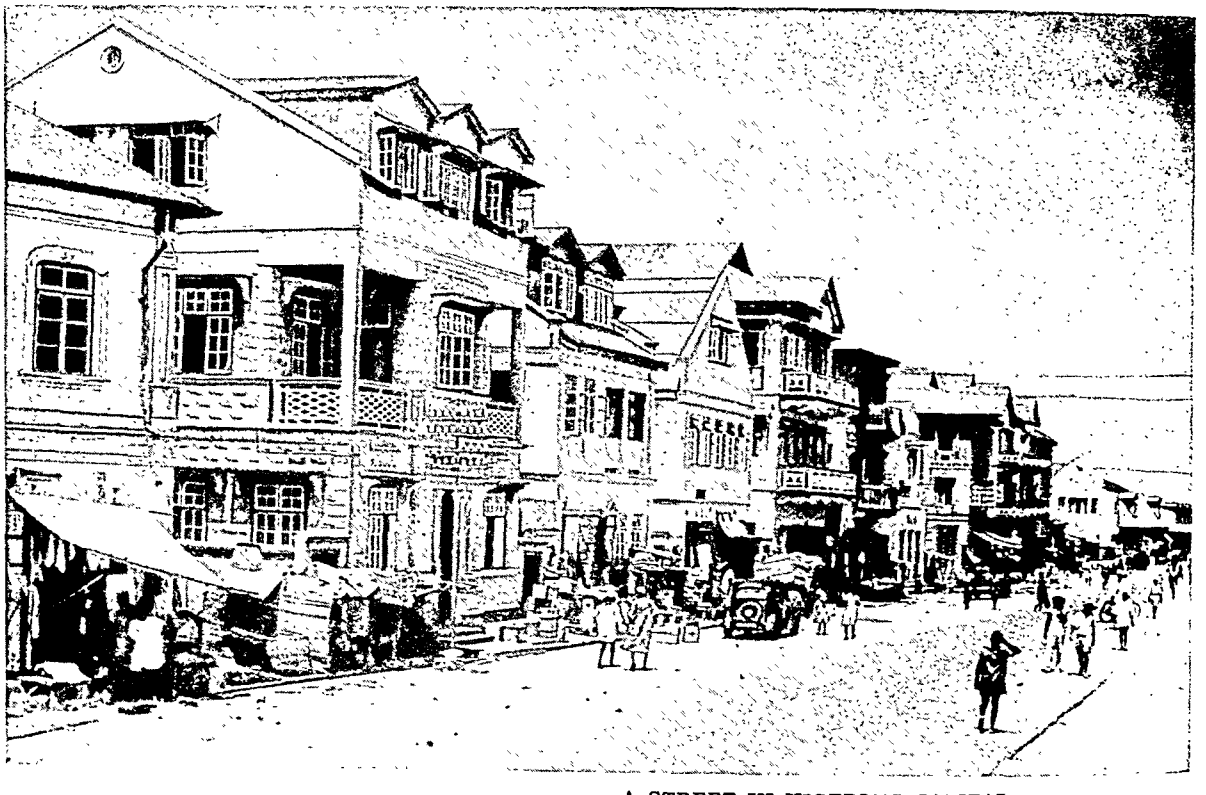
There are many nicknames, generally of an uncomplimentary character, applied by the people of one nation to those of another. Thus the American called the Mexican a "greaser," referring to his untidy appearance; while to the Mexican or Spanish-American an American or Englishman is a "gringo" (from the Spanish word for gibberish or unintelligible speech). (*See also* Yankee.)

Some people have thought that the word nickname came from the word *nick*, meaning "to cut," since a nickname is often a shortened form of the full name. Actually the word was originally *eke name* and it meant an "added name."

NIGERIA. Britain's colony and protectorate of Nigeria may soon become a leading power in Negro Africa along with its sister colony, the Gold Coast. These two West African colonies are closer to self-government and independence than any other colonial territories in Africa. (*See also* Gold Coast.)



Nigeria is located on the Gulf of Guinea where Africa's west coast starts to bulge into the Atlantic. Except for the coast, it is completely surrounded by French territory (for map, *see* Africa). Nigeria has political control of the British Cameroons, a United Nations trusteeship. Thus the region called Nigeria includes the colony, the protectorate, and the trusteeship. Its total area is 372,674 square miles. The total population (1953 estimate) is 31,500,000. Almost all



A STREET IN NIGERIA'S CAPITAL
Lagos is the capital of Nigeria and the residence of the governor. It is also Nigeria's chief port. The city is on an island linked to the mainland by a railroad and automobile bridge.

the people are Negroes. The capital and chief port is Lagos (174,000).

The Land and the People

Nigeria is about the size of Texas and Arizona combined. The coastal belt in the south is not far from the equator. It is wet and swampy and the yearly rainfall is heavy. The delta of the Niger River is a land of mangroves and tangled vines. Farther inland are lush and steaming tropical rain forests. The trees have huge trunks and loom up from the floor of the jungle in a tangle of vines and creepers. Then the rainfall decreases, the land gradually rises, and the forests give way to the rolling grasslands of the Sudan (*see* Grasslands). In the extreme north the land is desert, the lower fringes of the great Sahara.

Part of Nigeria is gorilla country. There are also baboons and chimpanzees. Other animals include elephants, leopards, antelopes, and wart hogs. Here also is found the bulging-eyed lemur. There are countless insects. Many, such as the tsetse fly, are disease carriers that affect both men and animals. There are crocodiles in the rivers.

The people of Nigeria, like the people of the Gold Coast and most of the rest of West Africa, are called "true" Negroes. This is because in the west coastal region there was never much mixing of races. In the extreme north, however, Nigerian Negroes sometimes intermarried with the Hamitic peoples of the Sudan. (*See also* Africa; Races of Mankind.)

The principal tribes are the Yoruba of southern Nigeria and the Hausa in the north. In general, the Yoruba are farmers and the Hausa are traders. The north is a land of massive mud-brick cities, trains of camels and other pack animals, and herds of goats. Most of the Hausa are Moslems. The Yoruba of the south were not influenced like the Hausa by Moslem culture from the north and east. Living by themselves they developed a culture of their own—one of the most ancient in Negro Africa. Their cities of Benin and Ibadan flourished long before Europeans entered the country. The greatest of the Negro empires and kingdoms sprang up in the land of the Yoruba. The sculptures of Benin became famous all over the world. While most of the Hausa are Moslem, the Yoruba are pagan ancestor-worshipers except for those converted by missionaries to Christianity.

Lagos, Nigeria's capital, sprawls along the coast. It is a town of corrugated iron houses with tin roofs, whitewashed warehouses, missions and churches, noisy bazaars, and crowded streets. It is Nigeria's chief port and has an international airport served by British Overseas Airways.

Farming, Mining, and Trade

Agriculture is the main industry. Nigeria's natural wealth comes chiefly from palm oil and cocoa. Other important crops are peanuts, rubber, cotton, hides and skins, rice, casava, millet, corn, and yams. There are also banana plantations.

The Nigerian mines have been worked for centuries. The most important minerals are lead, tin, and iron.

There are also deposits of manganese, silver, lignite, and coal.

The principal ports are Lagos, Port Harcourt, Sapele, and Calabar. Much of the trade within the country is carried over the inland waterways and by caravans of pack animals.

Nigeria's chief exports are cocoa, palm oil, peanuts, bananas, rubber, hides and skins, tin, and coal. The important imports are cotton piece goods, iron and steel, salt, tobacco, machinery, motor vehicles, petroleum products, and bicycles.

There are two main railroads. One runs from Lagos to Ibadan and then on to Kano and Nguru. The other links Port Harcourt with smaller inland trading centers. There are about 30,000 miles of road, none of which are very good. The best have tarred surfaces. Lagos has a radio broadcasting station. There are both international and internal air services.

History

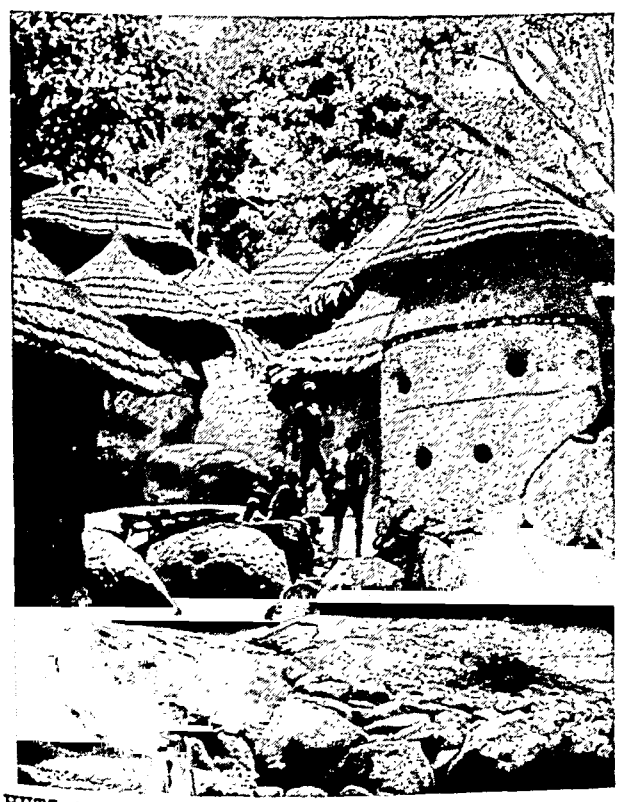
Northern Nigeria was known to the Moslem world of North Africa before Europeans ever saw Nigeria's south coast. Caravans from the Sahara were the contact with the lands of the Mediterranean Sea. Even in ancient times these caravans provided the markets of Europe with slaves, gold, and ivory from Nigeria.

Portuguese mariners were the first Europeans to find the Nigerian coast. Their ships sailed into the Gulf of Guinea early in the 15th century. They were followed by Dutch and English explorers. By the 16th century the English had established small trading posts in the region of the Niger River delta. The slave trade was at its height. Then, in 1833, slavery was abolished throughout the British Empire; and for a long time, except for a few explorers, the British lost interest in Nigeria.

British control of this region officially began in 1861 when they annexed Lagos with the consent of its African ruler. A colonial government was established. In 1866 it was placed under the control of the governor of Britain's colony of Sierra Leone. In 1874 it was transferred to the administration of Gold Coast Colony. Not until 1886 did Nigeria become a separate colony within the British Empire.

The colony of Nigeria, first confined to the coastal region, gradually acquired more and more territory to the north. Finally, in 1914, the whole region was brought under a single administration as the Colony and Protectorate of Nigeria.

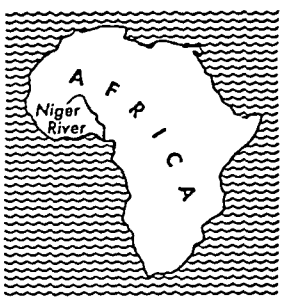
World War I had little effect on Nigeria. After World War II, however, Nigerians who had fought with the British in North Africa and Europe came home restless and discontented. They wanted self-government. Britain became more aware of its West African colonies. Both Nigeria and the Gold Coast were given constitutional changes that granted more power to their elected representatives. Both countries still have British governors but they are well on their way to independence. (*See also* Gold Coast.)



HUTS OF A PRIMITIVE PEOPLE

The Africans who live in these huts are the most primitive in Nigeria. The houses are grouped in compounds. Windows are only holes in the mud walls. The people do their cooking outdoors.

NIGER (*nī'jēr*) **RIVER.** Africa's third largest river is the Niger. Only the Congo and the Nile are longer.



The Niger is 2,600 miles long. It rises in French West Africa only 150 miles from the Atlantic. Then it flows northeast in a great arc, approaches the fringe of the Sahara, then bends southeast, enters Nigeria, and finally empties into the Gulf of Guinea. It has a huge delta, even larger than that of the Nile.

As a navigable stream, the Niger is of great importance. Steamers of light draft can make their way over most of its length. Through its largest tributary, the Benue, it provides a 870-mile highway eastward into Central Africa. A railway connects the upper reaches of the Niger with the Senegal River, which empties on the extreme west coast. Thus, by boat and rail, travelers can reach the famous French West African trading centers of Sansandig, Segou, Timbuktu, and other river stations far in the interior toward the Sahara.

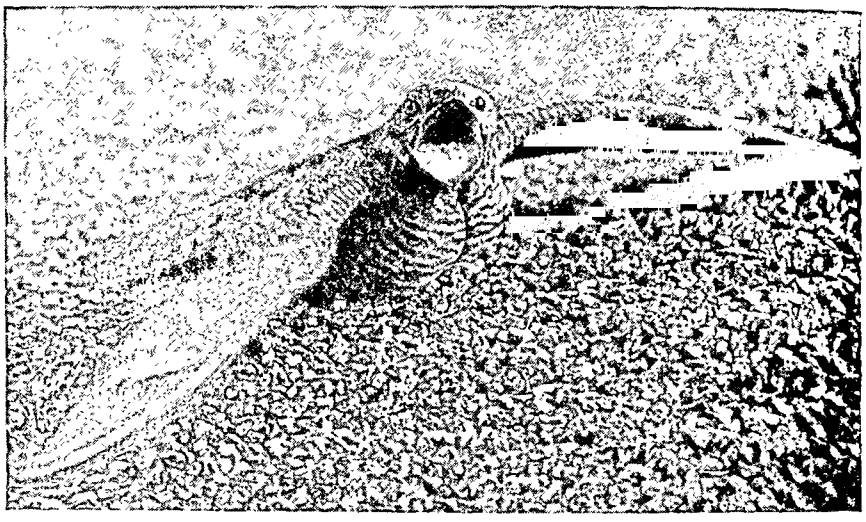
Niger shipping is chiefly engaged in the transport of palm oil, peanuts, copal (a resin used for varnishes), tree gums, rubber, coffee, ivory, and other products of the vast and luxuriant Niger River basin.

The delta of the Niger is very complex. About 80 miles north of the Nigerian coast, the river starts

fanning out into a network of small streams. Small rivers enter it from either side. In some places it is almost impossible to find a navigable channel. Along the coast the delta is about 150 miles wide.

Large steamers enter from the sea through the Nun Mouth, the Forcados, the Brass Mouth, and the Bonny. Because of mosquitoes and the tsetse fly, the delta's climate is one of the most unhealthy in Africa.

The ancient Greeks and Romans knew that the Niger existed and where it was located, but they never explored it. Eighteenth- and 19th-century explorers were hampered by cannibal tribes living along its banks and by the almost impassable jungle. The Niger was not accurately mapped until late in the 19th century.



A LIVING INSECT TRAP

Notice how the nighthawk's plumage blends into the gravel on which it is lying. The huge mouth scoops in flying insects.

NIGHTHAWK. On summer evenings, the nighthawk can be seen swooping erratically through the sky, catching a meal of insects. From time to time it utters a loud nasal cry, "pee-eent," and follows this with several quick, fluttering wingbeats. Then suddenly it performs a thrilling high dive. From a height of a hundred or more feet it plunges straight down on half-closed wings, apparently determined to dash itself into the ground. Within a few feet of a house or treetop, it abruptly turns and mounts upward again. At the moment of the turn, the rush of air through the large (primary) wing feathers produces a loud booming sound. No satisfactory explanation of this spectacular dive has ever been given. The bird seems to dive for the sheer fun of it.

The nighthawk has a great froglike mouth that opens from ear to ear. During flight it holds its mouth open and uses it like a trap to catch flying insects. The beak is a tiny tip, less than a half inch in length.

A grown nighthawk is about ten inches long, as large as a robin. The large wings are quite out of proportion to the body. The plumage is a mixture of black, gray, brown, and buff, almost invisible against the bark of a tree limb. In flight, a patch of white in the primaries looks like a hole in the wing. This white patch distinguishes the nighthawk from its near relative, the whippoorwill. Otherwise the two birds look exactly alike.

The legs of the nighthawk are small and weak. In wooded country it rests lengthwise on a tree limb. The birds also roost on the open ground of plains or deserts or on flat roofs in the cities. They build no nest. The two eggs are laid on gravel ground or on graveled roofs, where their grayish-white, black-spotted coloration blends perfectly into the background. (For picture in color, *see* Birds.)

The nighthawks breed throughout North America from the Yukon Territory to the Gulf states. They are among the latest migrants to arrive in the spring. By the end of August they gather in large flocks to start the long journey to their winter home in South America. While flying they keep from 50 to 100 feet apart.

The nighthawk belongs to the goatsucker family, *Caprimulgidae,* to which the whippoorwill also belongs. In the Southern states it is known as the bullbat. The names goatsucker and nightjar are more properly applied to a related bird found only in Europe. The scientific name of the nighthawk is *Chordeiles minor;* of the European goatsucker, or nightjar, *Caprimulgus europaeus.*



NIGHTINGALE, Florence (1820–1910). In 1854 a slim Englishwoman led a small band of volunteers to Turkey to nurse men wounded in the Crimean War. Florence Nightingale found filth, disease, and near-starvation among the wounded British soldiers. For two years she fought to wipe out these appalling conditions. She was hampered by official red tape and the army's prejudice against women. But in the end she won out. Wounded men were given real nursing care, perhaps for the first time in the history of war. Florence Nightingale became a famous authority on nursing and devoted her life to the improvement of hospitals.

Florence Nightingale was born May 12, 1820, in Florence, Italy, where her parents were spending a vacation. She was named for her birthplace. Her father, William Nightingale, was a well-to-do landowner of London and Derbyshire, England. Her

mother, Fanny, was a gay, charming woman, who loved society. William Nightingale taught Florence at home. She studied mathematics, music, and foreign languages.

Florence was a pretty girl and very popular. But she did not enjoy her mother's kind of social life. She liked to take care of the old and the sick people in the neighborhood. When she was 17 she wrote in her journal that God had called her to devote her life to nursing. She steadfastly continued to believe this. Later she refused to marry a man she liked because she felt that marriage would interfere with her work.

Over her parents' objections she visited hospitals in England and continental Europe. She studied the methods of the Catholic nursing orders in France and Egypt, and spent three months at the Institute for Protestant Deaconesses in Kaiserwerth, Germany. In 1853 she became superintendent of the Establishment for Gentlewomen During Illness, in London.

When war with Russia broke out, Miss Nightingale volunteered her services (*see* Crimean War). She was appointed head of the women nurses serving in Turkey. When she arrived, the death rate was 42 per cent. More men were dying from fever and infection than from battle wounds. She enforced sanitary regulations, introduced special diets, and reduced the death rate to 2 per cent. With her own money she bought linen, shirts, food, and even beds for the hospitals. Often she worked 14 hours a day without food or rest. Her health broke. She contracted Crimean fever (probably typhus), and nearly died. But she refused to return to England.

By 1856 Florence Nightingale was world famous. Longfellow wrote a poem, 'Santa Filomena', honoring her as the "Lady with a Lamp" (from her custom of walking through the wards at night, lamp in hand). England raised 50,000 pounds in her name to establish a nurses' home. Although invalided and often bedridden, Florence Nightingale was not done with her work. Back in England she set up office in her bedroom and campaigned by letter for hospital reforms. She enforced high professional standards in caring for the sick, and made nursing a worthy career for women. She died Aug. 13, 1910, at the age of 90.

NIGHTINGALE. No bird has been more celebrated in literature than the nightingale. Homer wrote of the "sweet, tawny nightingale." Milton called it the "most sweet, most melancholy bird." Keats had the nightingale in mind when he wrote of the

> . . . . song that found a path
> Through the sad heart of Ruth, when, sick for home,
> She stood in tears amid the alien corn;
> The same that ofttimes hath
> Charm'd magic casements, opening on the foam
> Of perilous seas, in faery lands forlorn.

Americans have to go abroad to hear this most famous of birds, for it does not live west of the Atlantic. Its relatives, the thrushes, are the only American birds that approach the nightingale in beauty of song. It is found throughout Europe, most abundantly in southern France, Spain, and Portugal, and in parts of England. Its song is heard most often in the spring. The bird called a nightingale by the ancient Persians, Greeks, and Romans was probably the Persian *bulbul.*

During the mating and nesting season, from the middle of April to the middle of June, the male sings day and night. His song is a melodious outpouring of glorious tone and is evidently an expression of devotion to his mate. Although the bird endures cage life, the male dies if taken during this time of year. The nest is a loosely built cup of dead leaves on or near the ground. It is supported by plant stems and lined with fibrous roots. The bird lays from four to six eggs, of a deep olive color.

This brilliant singer has drab plumage. The bird is about six inches long, with rusty brown and gray feathers. It is shy and perches in shrubs or low trees. Its favorite food is the larvae of insects, especially the larvae of ants and wasps.

The nightingale belongs to the family of thrushes, or *Turdidae.* The common European nightingale is *Luscinia megarhyncha;* the larger eastern species, *Luscinia philomela;* the bulbul, *Luscinia hafizi.*

NIGHTSHADE. Several weedlike relatives of the potato have mild or strong poisons in their leaves, berries, or roots. These plants are called the nightshades. The common or black nightshade grows about 12 inches high and has pointed, oval leaves, drooping clusters of white flowers, and small black berries. When animals chew the fresh leaves or people eat too many of the berries, they may be made sick. But in some regions, people boil the leaves and eat them as a kind of green.

Another plant of this nightshade group is the blue-blossomed bittersweet. Its scarlet berries taste both bitter and sweet and are mildly poisonous. Still another kind that is not very harmful is the horse nettle or apple of Sodom with its orange berry. This is a native of western North America.

The deadly nightshade, or belladonna, found in various parts of Europe and Asia, is particularly valuable to medicine. Various preparations of the leaves and roots are called *belladonna.* They are used to relieve pain or spasm, and as an antidote to opium. The active principle in these preparations is *atropine.* Oculists use it to hold the pupils of the eyes dilated during an examination. The deadly nightshade is a five-foot shrub with dull green leaves, purple bell-shaped flowers, and black cherrylike fruit. It has a disagreeable smell.

Nightshades belong to the family *Solanaceae.* Scientific name of common nightshade, *Solanum nigrum;* of bittersweet, *Solanum dulcamara;* of horse nettle, *Solanum carolinense;* of deadly nightshade, *Atropa belladonna.*

NILE RIVER. The longest river in Africa and the third longest river in the world is the Nile. In one sense the main course of the river actually begins at Khartoum. Here the Blue Nile comes in from the Ethiopian mountains. It flows clear and blue, except at flood time, when it is reddish brown. It meets the gray-green White Nile coming from the lake

THE NILE POURS FROM LAKE VICTORIA



Here the young White Nile plunges from Lake Victoria over 20-foot Ripon Falls in Uganda Protectorate. The falls were submerged and the lake level was raised when a flood-control and power dam was finished at Owen Falls a mile downstream.

region of Central Africa. The sources of the Blue Nile were known in ancient times, but about the White Nile geographers told legends of the Mountains of the Moon and underground streams. It is only in recent times that explorers have followed it back through the swampy "sudd" region with its reeds, white, blue, and crimson water lilies, and other floating vegetation, and its mosquitoes. They followed it past the rapids and waterfalls in which it descends from Lake Albert like a gigantic millrace, and from Lake Albert through the beautiful gorges of the Victoria or Somerset Nile which feeds Lake Albert from Lake Victoria, and thence to the headwaters of this lake, the Kagera River.

From Khartoum to Aswan the Nile descends in six cataracts. After Khartoum it receives only one tributary, the Atbara, another Ethiopian stream, which is 600 yards wide in flood time, and between floods almost dries up, so that fish, turtles, crocodiles, and hippopotami remain imprisoned in the deep pools of its upper reaches until the next flood time. After watering the whole land of Egypt the Nile finally reaches the Mediterranean through two channels. These are called the Rosetta and the Damietta mouths, and the general region is known as the Delta.

For thousands of years, Egypt has depended for crops and life itself upon the yearly floods of the Nile (*see* Egypt). These come from spring and early summer rains to the south, particularly in Ethiopia. The flood waters reach Egypt in July. Formerly the Egyptians let the water flood their land and deposit soil-renewing sediment. Today a great dam at Aswan holds the water for release throughout the year. The dam was completed in 1902 and heightened in 1912 and 1933. The Owen Falls Dam to control outflow from Lake Victoria was opened in 1954.

From Lake Victoria to the sea, the Nile is 3,473 miles long. To this could be added the headwaters—about 150 miles across Lake Victoria to the Kagera and the 430-mile length of that stream.

NIMITZ, CHESTER WILLIAM (born 1885). The commander of all United States naval forces in the Pacific during the second World War was Adm. Chester W. Nimitz. He was born in Fredericksburg in central Texas, far from the ocean. But in early boyhood he learned to love the sea. His grandfather was a retired merchant marine officer and owned a curious-looking hotel in Fredericksburg. People called it the "Steamboat" Hotel because it had a porch and tower shaped like the superstructure of a ship. Young Nimitz held mock battles on the tower, while his grandfather told him stirring yarns of the sea.

But after graduation from school at near-by Kerrville, Nimitz wanted to enter West Point. No appointments were vacant, and so he took examinations for Annapolis. He entered in 1901. He was a good student and was graduated with distinction in 1905.

Nimitz' first duty was in Asiatic waters. He commanded the gunboat *Panay* and later the destroyer *Decatur*. Then came customary tours of sea and shore duty. In 1913 he married Catherine Freeman of Wollaston, Mass. They had four children. Nimitz became a submarine and Diesel-engine expert. In the first World War he was chief of staff to the commander of the Atlantic Fleet's submarine force.

CHESTER NIMITZ



Admiral Nimitz led American naval forces in the Pacific in the second World War.

In 1921 Nimitz was made a commander, and the next year attended the Naval War College. From 1926 to 1929 he headed the Naval R. O. T. C. at the University of California. He rose through other sea and shore commands to the post of chief of the Bureau of Navigation in 1939. He was then a rear admiral.

Ten days after Pearl Harbor, Nimitz was given command of the Pacific fleet. He arrived in Hawaii to find morale low and organization disrupted. He rebuilt the fleet and launched it on a series of campaigns that brought victory. He chose his commanders carefully, then gave them full responsibility in planning and carrying out attacks.

Despite a strenuous schedule of work, slim, bronzed Nimitz always found time for sports. Tennis, marksmanship, and swimming became his favorites. He became a fleet (five-star) admiral in 1944. In December 1945 he succeeded Adm. Ernest J. King as chief of naval operations. Nimitz retired in 1947, but returned to public service in 1949 as United Nations administrator for the Kashmir plebiscite.

NINEVEH (*nĭn'ĕ-vĕ*). When the people of Israel were suffering under the heavy yoke of the proud and ruthless Assyrian kings, the Old Testament prophets called down the vengeance of heaven on Nineveh, the splendid capital of the Assyrian Empire. "Woe to the bloody city!" they cried. "The Lord will make Nineveh a desolation and dry like a wilderness." The prophecy was fulfilled when the hordes of the conquering Medes and Chaldeans more than 25 centuries ago (612 B.C.) swept over the doomed city and made it a desolate waste. As the centuries went on the sun-dried bricks of which most of the houses were built crumbled to dust. The drifting sands covered the ruins, mounting higher and higher, until every trace of the once mighty capital was lost. Finally the very memory of its location disappeared except for a native tradition.

It was not until the middle of the 19th century that archeologists set to work on the vast flat-topped mounds with pick and shovel. They uncovered evidence that the mounds marked the site of one of the most magnificent capitals of antiquity. More than that, the walls and sculptures and libraries they brought to light have enabled men of science to rewrite the great lost chapters of history that tell of the empire of the Assyrians. Nearly every important fact we have today about Assyria has been discovered since the 1840's. These discoveries were made as the result of excavations at Nineveh and other sites in the ancient valley of the Tigris.

One of the earliest and most successful of these investigators was an Englishman, Sir Henry Layard. He unearthed (1845–51) the palaces of Sennacherib and Ashurbanipal with their alabaster bas-reliefs of hunts and sieges and battles, and colossal winged man-headed statues of bulls and lions. Most important of all, he found many thousand tablets of Ashurbanipal's library. These have now been deciphered and tell us the story of science, history, religion, and literature in the days of Assyria, and Babylonia as well. Excavations have been proceeding ever since, but incalculable treasures still remain to be brought to light.

The mounds, extending at intervals for some 20 miles along the Tigris, opposite the modern city of Mosul, represent not only the city of Nineveh proper, but also of Dur Sharrukin, the city of Sargon II, and Kalah. Nineveh, though it existed at least as early as 2000 B.C., was chiefly the creation of Sennacherib (705–681 B.C.), who walled and fortified it for two and a half miles along the Tigris, building a great new palace and laying out extensive gardens. (*See also* Babylonia and Assyria.)

NIOBE (*nī'ō-bē*). One of the saddest stories in Greek mythology is that which tells how the proud Niobe, daughter of Tantalus and wife of Amphion, king of Thebes, was punished for her presumption. She boasted of her seven sons and seven daughters and despised the goddess Leto (Latona) who had only one son and one daughter. But the children of Leto were the great Apollo, god of the sun, and Artemis (Diana), goddess of the moon. For this arrogance they slew all the children of Niobe with their arrows. Niobe's grief was so great that Zeus out of pity changed her into a rock on Mount Sipylus, from which tears continued to flow.

NITRATES. Most forms of plant and animal life could not exist without the chemical compounds called nitrates. Two of the common ones, potassium nitrate and sodium nitrate, are extremely valuable because of their use in fertilizers and explosives. Silver nitrate has wide uses. It is employed as a caustic in medicine, as a light-sensitive substance in photography, and to silver the backs of mirrors. Iron nitrate is used in dyeing; and barium and strontium nitrates give brilliant colors to fireworks.

The molecule of every nitrate has within it a combination of atoms known as the *nitrate radical.* This consists of one nitrogen atom bound to three oxygen atoms. Its chemical formula is NO_3. The nitrate radical stays together and acts as a unit in most chemical reactions. It does not exist by itself, however, except in the ionized state (*see* Ions). Therefore in the normal state the nitrate radical is always found attached to some other kind of atom—most frequently those of metals.

The nitrate radical is somewhat unstable. Nitrogen does not enter into chemical combinations easily, and when it does it tends to go back to its normal free state. Nitrates also dissolve readily in water. These two facts make nitrate compounds very useful to plants, for all plants need a constant supply of nitrogen in order to form proteins for body building. Without an ample supply their growth is poor and stunted (*see* Plant Life).

But most plants cannot use the vast amounts of free nitrogen in the air; they can use only nitrogen that they get from the soil. So the fact that nitrates dissolve and release their nitrogen easily makes them the chief supply of nitrogen in nature.

Since nitrates dissolve so easily, they are rarely found in nature. Decaying plants give up nitrates, and the excrement of animals also contains these compounds. But rain usually washes the nitrates away and the compounds break up. Potassium nitrate (saltpeter) is found free in a few regions, however, chiefly in eastern India. And vast deposits of sodium nitrate (Chile saltpeter) exist in the desert regions of Chile and Bolivia.

All nitrates may be called *salts* of nitric acid. In their formation, an element such as potassium (K) replaces hydrogen (H) in nitric acid (HNO_3). The resulting salt, potassium nitrate, has the formula KNO_3. In the reaction, free hydrogen is given off. In similar fashion, silver (Ag), sodium (Na), and most other metals replace hydrogen readily in nitric acid. Gold and platinum do not, however, and aluminum does so only slowly. Compounds such as ammonia and cellulose also can form nitrates in this way.

Nitrates are distinct from *nitrites,* another group of nitrogen compounds. These are salts of *nitrous acid* (HNO_2). Unlike nitrates, they are highly stable.

NITRIC ACID. For hundreds of years nitric acid has been one of the world's most important chemicals. Geber, the famous Arabian scientist, discovered it in the 8th century. He called it *aqua fortis* ("strong water") because it attacks so many other substances, including nearly all the common metals. It was first prepared by treating potassium nitrate (saltpeter) with sulphuric acid (oil of vitriol), and some is still made in that way.

Most of our supply, however, is derived from the oxidation of ammonia by the Ostwald method. Ammonia, prepared by the Haber process (*see* Nitrogen), is mixed with heated air and passed through platinum gauze, which acts as a catalyst. The ammonia (NH_3) reacts with the oxygen in the air to form nitric oxide (NO) and water (H_2O). The nitric oxide is then further oxidized to nitrogen peroxide (NO_2), which unites with the water to form nitric acid (HNO_3).

Nitric acid is a colorless, fuming liquid with so strong an affinity for water that it is difficult to get a concentration over 95 per cent. The commercial acid ranges in strength from 50 to 70 per cent and usually looks yellow from the presence of various oxides in solution. For, in addition to being a strong acid, nitric acid is a powerful oxidizing agent.

When metals, metallic oxides, or carbonates come into contact with nitric acid, the salts called *nitrates* are formed. These are important in the making of fertilizers and explosives such as dynamite (*see* Nitrates; Fertilizers). The nitrating of cellulose for making rayon, pyroxylin, and similar plastics is accomplished with nitric acid (*see* Cellulose).

NITROGEN, PRESERVER *and* DESTROYER *of* LIFE

NITROGEN. About four-fifths of the air we breathe consists of the gas called nitrogen. But we do not use this gas in our lungs. We breathe it out again unchanged. It serves only to dilute the oxygen of the air so that we will not get too much at one time. This is one of nitrogen's most important jobs. If the air were all oxygen, breathing it would soon "burn" us up in the chemical sense of the word (*see* Oxygen). And if a blaze started anywhere, it would be virtually impossible to put it out. In pure oxygen, even iron will catch fire. As it is, the nitrogen in the air slows down the action of the oxygen.

Free nitrogen has this effect because it is very inactive. It does not burn or help other things to burn. It is slow to enter into any kind of chemical union. That is why there is so much of it at large in the atmosphere. It is not one of the commonest elements (*see* Chemistry), but what there is in the world is mostly out in the open. Relatively little nitrogen is locked up in combinations with other elements, compared, for example, to the vast amounts of oxygen and hydrogen locked up in the form of water.

Nitrogen Compounds Essential to Life

In sharp opposition to nitrogen's inactivity and its reluctance to form compounds stands the fact that *nitrogen compounds are absolutely essential to all forms of life*. Protoplasm, the complex substance inside all living cells, requires nitrogen for its formation; and the essential food materials called proteins are all built around nitrogen compounds (*see* Proteins; Protoplasm).

It is easy to see, therefore, that the processes by which nitrogen is captured and put to work are tremendously interesting and important to us.

Capturing nitrogen from the air is called *nitrogen fixation*. In nature it takes place in two ways: by the action of lightning and by the action of bacteria. When a flash of lightning passes through the air it causes nitrogen to unite with oxygen in the form of nitric oxide (NO). As this cools, it takes on another atom of oxygen and becomes nitrogen peroxide (NO_2). This in turn joins with rain water or water vapor (H_2O) in the atmosphere to form nitric acid (HNO_3). The acid is carried down to earth, where it reacts with minerals in the soil to produce nitrates, like potassium nitrate or saltpeter (KNO_3) (*see* Saltpeter). These nitrates can be used directly by plants to form the proteins out of which their living cells are built.

But the thundering and gigantic power of lightning is not nearly so effective as the quiet work of the tiny nitrogen-fixing bacteria. It has been estimated that electric storms produce all over the earth about 80 million tons of nitric acid a year. This is nowhere near enough to keep the supply of fixed nitrogen up to the requirements of living nature. Bacteria must provide the rest.

Bacteria That Put Nitrogen to Work

There are two kinds of nitrogen-fixing bacteria: those that live on the roots of plants and those that live free in the soil. The root dwellers belong to the genus *Rhizobium*. The free-living kind include the species called *Clostridium pasteurianum* and several species of the genus *Azotobacter*. The former stands out like a saint among sinners, for all others of the Clostridium genus are bacteria of disease, notably those that cause tetanus and gas gangrene.

Nitrogen-fixing bacteria take the nitrogen directly from the air, combine it with hydrogen, and use this combination in building proteins. The root-dwelling type thrive only on the roots of leguminous plants like alfalfa, clover, beans, and peas (*see* Alfalfa). But they fix more nitrogen than these plants require; so the surplus is stored in the roots and passes into the soil when the plants are harvested or die. That is why leguminous crops are said to enrich the soil in which they grow.

Keeping Nitrogen in Circulation

Once the nitrogen has been built into living tissue, it may be used over and over again. Animals get their proteins either from plants directly or by devouring plant-eating animals. When a plant or animal dies, some of the bacteria of decay break up the protein, and the nitrogen emerges in the form of ammonia (NH_3). Part of this escapes into the air, but most of

it is seized upon by another type of bacteria and turned into nitrites. And still another type of bacteria turns the nitrites into nitrates—ready to be used by plants in forming a new supply of proteins.

The bacteria that do this kind of work are called *nitrifying bacteria,* in distinction from the nitrogen-fixing bacteria. Unfortunately, there are also *denitrifying bacteria* which, during the decay of protein, set nitrogen free into the air again. And it is this continual loss that must be made up.

The processes by which nitrogen circulates between air and soil and among the different forms of life is called the *nitrogen cycle.* (For details of how plants use nitrogen, *see* Plant Life.)

Fertilizers and Explosives

Wild plants die and give back their nitrogen to the soil where they grew. But our harvests are continually taking it away without return. That is one of the reasons why farmers must use fertilizers (*see* Fertilizers). Those that supply nitrogen include sodium nitrate, ammonium sulphate, and the waste products of animals and birds, like manure and guano.

Ammonium sulphate is a by-product of coke manufacture. Sodium nitrate, also called niter or Chile saltpeter, is found in vast deposits in the deserts along the western coast of South America. It accumulated there ages ago as the result of plant decay and escaped being washed away when the climate changed to almost perpetual drought.

The reluctance of nitrogen to unite with other elements is matched by its readiness to break away from such unions whenever it gets the chance. Thus most nitrogen compounds are relatively unstable, and some of them break up with great violence. These are the sources of most of our explosives, including gunpowder, guncotton, dynamite, nitroglycerin, trinitrotoluene (TNT), and the several fulminates (*see* Gunpowder; Explosives).

Artificial Fixation of Nitrogen

The great demand for low-cost nitrogen compounds in making both fertilizers and explosives exceeds the supply from natural sources. For this reason industrial science has worked out several methods of artificial nitrogen fixation. Some of these are patterned after nature; others are products of the laboratory.

Electric Arc Process: This reproduces the effects of lightning. Air is blown through a gigantic electric arc; nitrogen and oxygen unite to make nitrogen peroxide gas, which then passes through a spray of water and forms nitric acid. Only where electric power can be generated at very low cost, as in Norway, is this method practical.

Cyanamide Process: Nitrogen is circulated over hot calcium carbide (CaC_2) with the result that the nitrogen replaces part of the carbon, forming calcium cyanamide ($CaCN_2$). This may be used directly as a fertilizer or may be treated with steam under pressure to produce ammonia.

Haber-Bosch Process: A mixture of nitrogen and hydrogen is subjected to tremendous pressure in the presence of a catalyst, usually a compound of iron. The two gases unite to form ammonia. Fritz Haber invented this process in Germany in 1913 and Karl Bosch improved it. It provided Germany with fertilizers and explosives when the supply of natural nitrates was cut off by war. The Casale process and the Claude process are variations of the Haber-Bosch technique. This method of nitrogen fixation is most widely used.

Chemistry of Nitrogen

Nitrogen was first recognized as a distinct substance in 1772 by Daniel Rutherford of the University of Edinburgh. It is commercially prepared by evaporation of liquid air. The more volatile nitrogen comes off before the oxygen. One of the few direct uses of free nitrogen is in making "gas-filled" electric lamps (*see* Electric Light and Power). But in the importance of its compounds, both for living things and in industry, it ranks next to the "big three"—hydrogen, oxygen, and carbon.

Its valence ranges from one to five, illustrated by its compounds with divalent oxygen: nitrous oxide (N_2O), nitric oxide (NO), nitrogen trioxide (N_2O_3); nitrogen peroxide (NO_2), and nitrogen pentoxide (N_2O_5). Most of its compounds, however, are formed with valences of three or five.

The two most widely known compounds of nitrogen are respectively an acid and a base—nitric acid and ammonia (*see* Nitric Acid; Ammonia). In the interesting compound ammonium nitrate (NH_4NO_3) both basic and acid nitrogen appear in the same molecule, with the ammonium part (NH_4) showing a valence of three and the nitrate part (NO_3) showing a valence of five.

Nitrogen combines with several of the metallic elements such as magnesium and calcium, to form nitrides (Mg_3N_2) which react with water to yield ammonia. When carbon and nitrogen together combine with a metal, a cyanide is produced, like the highly poisonous cyanide of potassium (KCN).

Organic Compounds of Nitrogen

As we have seen, the proteins are the most important of the organic compounds of nitrogen. They are built up in a unique manner from the amino acids which contain nitrogen in the amino combination—NH_2 (*see* Biochemistry). These acids are "amphoteric" substances; that is, they can act both as acids and bases. Thus the acid part of one amino acid molecule can combine with the basic part of another amino acid molecule, and so on, until several join together in forming the huge complex protein molecules.

There are few dyes that do not contain nitrogen. The formula for aniline ($C_6H_5NH_2$) reveals that it is formed from the benzene ring (C_6H_6) by substituting an amino group for one of the hydrogen atoms. The special value of the aniline dyes for silk and wool arises from their affinity for the proteins of which these animal fibers are composed. This affinity is responsible also for the effectiveness of many antiseptics and germicides containing nitrogen. Most photographic developers contain nitrogen. So do many hypnotic drugs and the alkaloids, such as caffeine, quinine, and morphine. (*See* Chemistry; Anesthetics.)

NOBEL (*nō-bĕl'*), ALFRED BERNHARD (1833–1896). During his life, Alfred Nobel made millions of dollars by his invention and manufacture of dynamite. But he left his vast fortune to promote world peace and to advance knowledge (*see* Nobel Prizes).

Nobel was born in Stockholm, Sweden, on Oct. 21, 1833. His father, Immanuel Nobel, was a self-educated inventor. Alfred was the third of four sons. Failing in business in Stockholm, Immanuel Nobel took his family to St. Petersburg (now Leningrad). There he had some success manufacturing rifles and land and water mines for the Russian government. Alfred was a sickly child. He was educated at home, first by his mother and later by tutors. He was a quiet boy, well-read in science and literature. Instead of going to high school, he traveled widely in Europe and the United States. He learned chemistry and mechanical engineering through his own studies.

ALFRED NOBEL



The inventor of dynamite left a fortune for peace.

At 21, Nobel joined his father and brother in St. Petersburg. Immanuel Nobel had begun some experiments with nitroglycerin, but had abandoned them. Nobel resumed the work and invented a blasting cap made of fulminate of mercury to fire a charge of nitroglycerin. The cap was one of the most important inventions in explosives since the invention of gunpowder.

Though still sickly, Nobel took charge of the family's business. In 1863 he returned to Sweden and set up a small factory to make nitroglycerin. A year later a terrific explosion destroyed the plant and killed five people. One was his youngest brother, Emil. But Nobel refused to give up work and moved the plant to a barge moored in a lake. Further tragedies occurred. In 1866, after disastrous explosions at world ports many nations forbade their vessels to carry nitroglycerin. Nobel then sought to make the explosive safer to handle. He found the answer in dynamite (*see* Dynamite).

The invention made Nobel wealthy. He spent the next ten years patenting his discovery and setting up plants in the United States and European countries. In 1876 he patented blasting gelatin, a combination of guncotton and nitroglycerin. In 1878 he helped his brothers Robert and Ludwig develop the rich Baku oil fields in Russia. He invented ballistite in 1888, one of the first smokeless powders.

For most of his life Nobel lived for nothing but work. He never married. He found recreation in his laboratory and in writing poetry in imitation of his literary idol Shelley. In later years he traveled throughout Europe and had homes in Paris, Stockholm, and San Remo, Italy. In 1876 he met Bertha Kinsky (later Baroness von Suttner), a Bohemian noblewoman. She became one of the world's leading pacifists. In letters to Nobel over several years she developed his ideas for world peace. Nobel's bequest for a peace prize was largely in tribute to her, although he remained somewhat cynical over the effectiveness of the pacifist movement. He died in 1896 at San Remo, leaving the executors of his will to establish the system for administering the Nobel prizes.

NOBEL PRIZES. Alfred Nobel, Swedish chemist and inventor of dynamite, left more than $9,000,000 of his fortune to found the Nobel prizes. Under his will, signed in 1895, the income from this fund was to be distributed yearly in five equal parts as prizes to those who had most helped mankind. A prize was to be awarded in each of these five fields: physics, chemistry, physiology (or medicine), literature, and peace. The physics and chemistry awards were to be made by the Swedish Academy of Science; physiology or medicine, by the Caroline Institute of Stockholm; literature, by the Swedish Academy of Literature; and peace, by a committee of five chosen by the Norwegian Parliament.

A code of statutes, drawn up after Nobel's death, has interpreted and carried out his will through the years. The statutes have modified the will by providing that a prize may be omitted in any year. The peace prize has been the one omitted most frequently.

The Nobel prizes were first awarded Dec. 10, 1901, fifth anniversary of Nobel's death. They have since been given every December 10 when possible—the peace prize in Oslo, the other four in Stockholm. No Nobel prizes were announced for the war years 1940, 1941, and 1942. The amount of each prize, more than $40,000 in 1901, varies from year to year with the income from the fund. Often a prize in a given field is divided among two or more winners.

In keeping with Nobel's will, all nationalities are eligible for awards. A Polish-born citizen of France, Mme. Marie Curie, was the first person to receive more than one of the Nobel prizes (co-winner in physics, 1903, and winner of a full prize in chemistry, 1911). (For American and Canadian winners, *see* table under entry **Nobel Prizes** in the FACT-INDEX.)

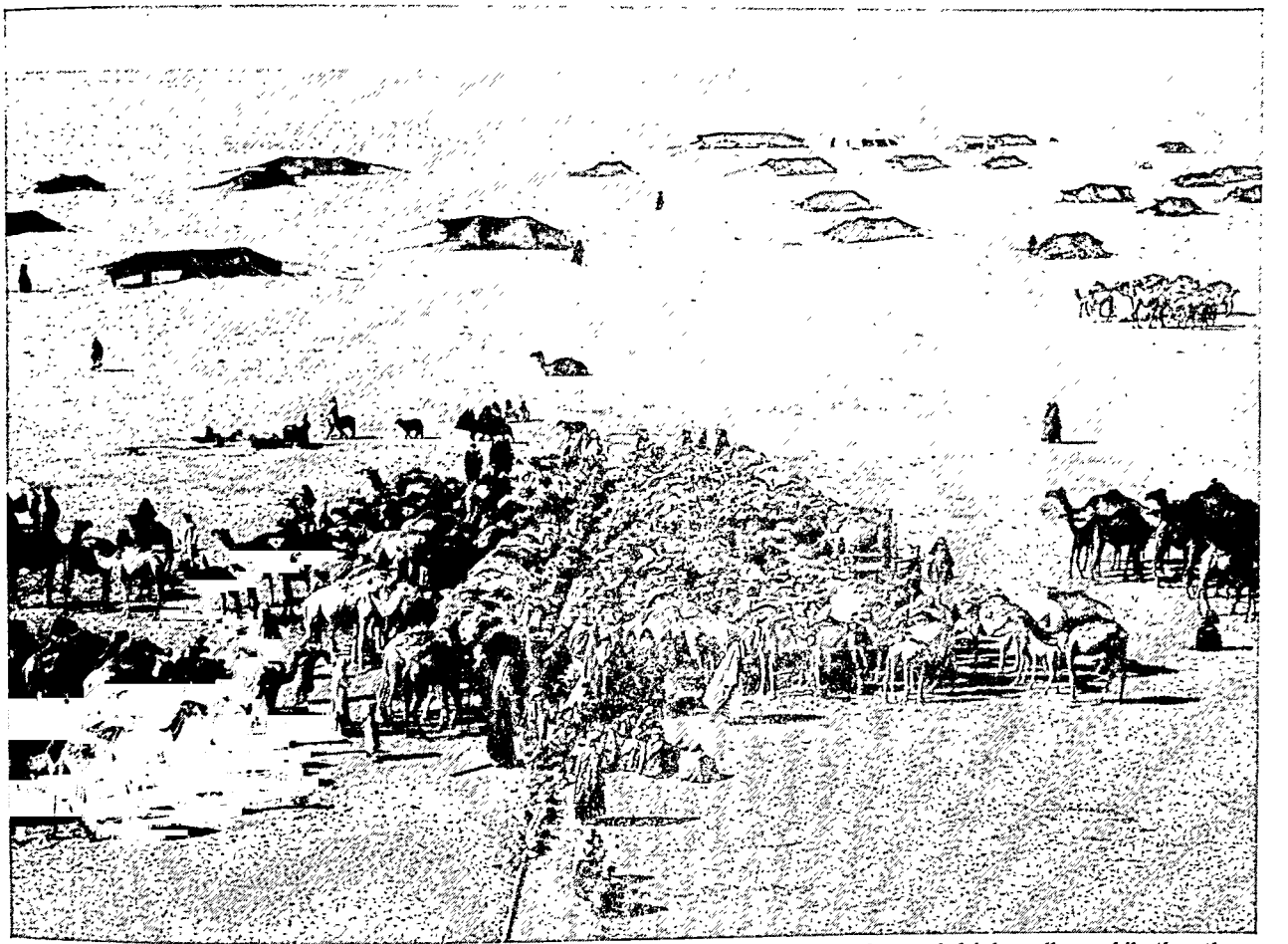
NOMADS. Lands too dry for farm crops and forests are the earth's great pastures. Many deserts have grass or shrubs enough for camels and sheep, and the *steppes* on borders of deserts bear good short grass (*see* Deserts; Grasslands). The grazing animals soon eat all there is in one place and owners must keep moving them to fresh pastures. People who live in this way are *nomads*. Their animals provide milk, meat, hides, and hair or wool for cloth and rugs. They live in tents that can be easily moved.

The most famous of all nomads are the Arabs who live in the Arabian Desert (*see* Arabia). They are called Bedouins ("desert people"). They live much as Abraham, Isaac, and David lived in the same desert land in early Bible times.

Life in a Bedouin Tribe

Usually a Bedouin is small and thin, for food is scarce in the desert. His skin is naturally light,

THIRSTY CAMELS CROWD AROUND A WATERING TROUGH



These camels have just come in from pasture and have not been watered for days. Each camel drinks gallons while the others wait their turn. Among the black tents of the Bedouins can be seen two small white tents of traveling merchants. The merchants will brand the animals they want to buy and will take them at the end of the season.

but it has been burned brown by the sun. He has never gone to school and cannot read or write. He believes "there is no god but Allah," and he tries to follow the teachings of Mohammed (*see* Mohammed). Mohammed says he should wash before praying. The Bedouin has hardly enough water for drinking and cooking, so he washes by rubbing his hands with dry clean sand.

The largest Bedouin tribe has about 3,000 tents and 75,000 camels. The whole tribe is hardly ever together. The herdsmen scatter in bands of fifty or more to find grass for their own beasts. The sheik is the chief of the whole tribe. He may own a thousand camels and a dozen swift Arabian horses. A herdsman usually owns only two or three camels.

The sun is scorching hot on the Arabian Desert. The herdsmen must be in the sun all day tending their animals. Their clothes must protect them from the sun and from sudden sandstorms whipped up by strong winds. The Bedouin wears a white cotton shirt that reaches to his heels, with long sleeves. Over this he throws his *aba*—a square of striped wool cloth with holes for the arms. At night he uses the aba for a blanket. On his head he wears a round wool cap, and over this a colored kerchief. He binds the kerchief to his head with a thick wool cord. He goes barefoot unless he has to walk a long distance on stony ground. Then he wears sandals made of camel hide. His wife dresses much the same way except that her clothes are dark blue and she fastens her kerchief with a band of folded cloth.

The Bedouin calls a tent the "house of hair" because it is made of black goat-hair cloth. The top is 20 or 30 feet long. A separate strip hangs down the back. On cold winter nights the front is closed with another strip. The family sit and sleep on cotton quilts. They have no glass or china, no furniture, and no stove. The mother cooks over an open fire. She makes the fire in a pit and puts three stones around the edge to hold the cooking pot. For fuel she burns desert brush and dried camel dung.

The sheik's tent is about a hundred feet long. It is divided into two parts by curtains. The smaller part is for the sheik and his guests. It is furnished with beautiful carpets and soft pillows. The larger part is for the women and children and for storage. When the sheik sets out for the desert he loads about fifty camels with sacks of wheat, barley, salt, coffee, rice, and dates.

The sheik likes to have guests because it is lonely in the desert. When he entertains an important visitor he has his servants kill a lamb or a kid. While

A NOMAD FAMILY AT HOME



This is a family of Bedouins—Arabs of the desert. Because they are Mohammedans, the woman would not pose for the photographer until she had covered her face with a heavy veil. She took it off as soon as the picture was taken. Bedouin women are much too busy to be bothered wearing veils in the hot desert.

it is roasting, the women cook rice and bake bread. They pat the dough very thin. Then they throw it over a dome-shaped iron placed over a fire pit. The cooked meat, rice, and bread are put into a wooden bowl so large it takes two men to carry it. The guests sit on rugs around the bowl and eat out of it with their fingers. The sheik serves coffee at the end of the meal from a shiny brass coffeepot. He will not eat until all his guests have finished.

The herdsman's family rarely have bread or meat. For breakfast and lunch they have only camel's milk, fresh or sour. For supper they have more milk, dried dates, and a little wheat boiled in water. They have a feast when a swarm of locusts appears. They eat some of the insects roasted hot. The rest are dried, ground to powder, and stored.

Moving day comes when there is no more grass for the camels. Then the tents are taken down. The tent cloth is rolled on poles and slung across a camel's back. Other camels are loaded with household goods and leather bags of food and water. The water and food are for the nomads and the horses. The camels will not need to eat or drink on the journey (*see* Camel). Just before the march begins they are led to a long leather watering trough. The men encourage them to drink all they can hold. A very big camel can drink 60 or 70 quarts.

The sheik and his armed band ride ahead on fast camels (*dromedaries*) to protect the tribe against robbers. Then come the pack camels and the *litter* camels. A litter is a large light wooden cage with loop holes projecting on either side. It is decorated with bright tassels, shells, and colored cloth. Two women and several small children can all ride in one litter.

During the march the nomads sleep on the open ground. After a week or more they reach the new camping place. They set up their tents around a water hole or well. Only the tribe owning a well is allowed to draw water from it.

August is the hottest, driest month. Then the grass dies and the nomads make their way to an *oasis*. The oasis is in the desert but it is not dry. For a mile or two around the oasis village spread date palms and green fields. The larger oases are watered by mountain streams. Small oases lie in low land where underground water can be tapped for irrigation.

The nomads camp at the edge of the oasis. Soon traders appear and set up small white tents. The nomads sell them all the camels they can spare. With the money they get, they buy food, cloth, and weapons in the oasis village. In September they set out into the desert again to breed more camels.

The Arabs introduced the tent to Africa. On the northern edge of the Sahara, Berber nomads live in tents like those of the Bedouins of Arabia. Most of the vast Sahara is so dry even camels cannot find pasture there (*see* Sahara). The great deserts of Turkestan, in central Asia, are colder and have more rainfall. Here nomads raise sheep, cattle, and horses. They wear thick padded clothes and live in *yurts*, which are circular tents, covered with wool felt.

When rain fails, nomads can get food only by raiding farms. Throughout history they have warred on the settled agricultural peoples. In times past they have even swarmed over Europe (*see* Mongols; Huns). Today the nomad way of life is fast vanishing.

NORFOLK, VA. Since colonial days, Norfolk, with its surrounding area, has served as a key base in the defense of American shores. The city is situated on Hampton Roads, the great natural harbor where the James River flows into Chesapeake Bay. It shares the harbor with Portsmouth, Newport News, and Hampton (*see* Virginia). Together these four cities command a strategic approach on the Atlantic coast.

The chief United States military establishments in the area are the Norfolk Naval Station, in Norfolk; the Norfolk Naval Shipyard, in Portsmouth along the Elizabeth River; and the Langley Air Force Base, in Hampton. The port of Norfolk is joined with those of Portsmouth and Newport News to form a single customs unit—the Port of Hampton Roads. This port ships coal, scrap iron, grain, tobacco, cotton, canned goods, and lumber. Among its imports are wood pulp, ore, petroleum products, and sugar.

Norfolk's development as a great maritime city came with the advance of railroads, which made it the water outlet for the rich Virginia back country. It is now a giant rail and water terminus, served by nine trunk railways and many foreign and domestic steamship lines. Spurred by the growth of its shipping trade, it became one of the leading industrial cities of the South. Shipbuilding and repairing is one of its major industries. It has a large automobile assembling plant and factories producing clothing, thread, and fertilizer. Norfolk is the center of a vast sea-food industry. The city has a municipal auditorium and stadium, a public library system, a museum of arts and sciences, and a number of fine parks and playgrounds. It is also a resort for swimming, hunting, and riding.

Norfolk was founded in 1636. During the Revolution, in January and February 1776, it was completely burned except for St. Paul's Church (built in 1739). Since 1919 the city has had a city-manager form of government. Population (1950 census), 213,513.

NORMANDY, FRANCE. During "apple blossom time," no land is lovelier than the old province of Normandy on the north coast of France. From sandy beaches and white chalk cliffs, Normandy stretches back in a gently rolling countryside. Woodlands, shining streams, and thatched, white stone farmhouses bespeak peace. Yet when the second World War thundered over Normandy's hedgerows, the fury was only another chapter in the land's tempestuous history.

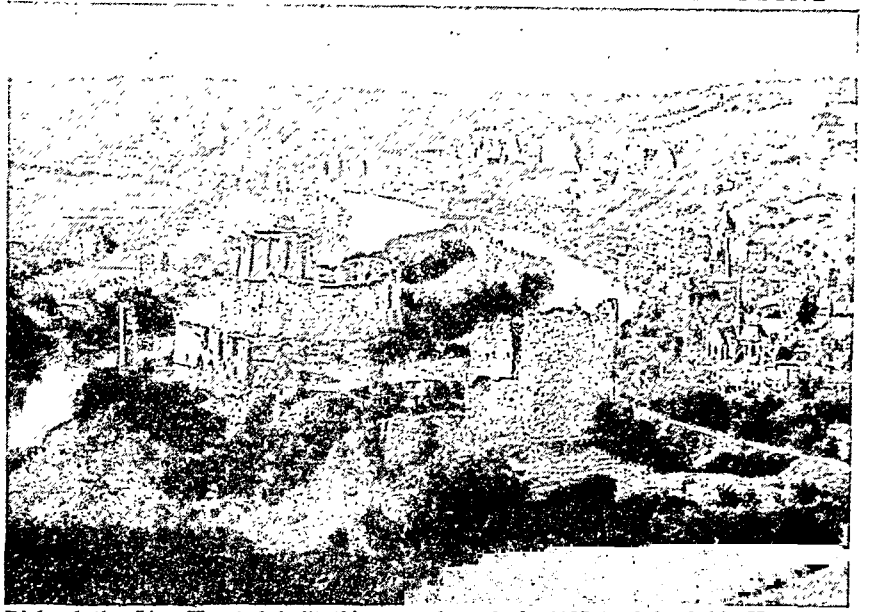
"Normandy" means "land of the Northmen." These terrifying Vikings invaded the region in the 9th century, steering their dragon-prowed ships up the Seine, and spreading fire and sword along its banks far inland to Paris. (For picture, *see* Northmen). In 911 Charles the Simple concluded a treaty of peace with their chief, Rollo, which granted them a large part of Normandy; they later took the rest.

Exploits of the Norman Nobles

With their marvelous facility for adaptation, the Northmen within a century became patriotic Frenchmen. Abandoning their fierce ways, they took up the French language and the Christian religion. But they retained their old fondness for travel and adventure. Five stalwart sons of one Norman family found their way to Italy, where they established a kingdom in the south. The dukes of Normandy meanwhile rose in power until one of them, William, crossed the channel and took possession of England in 1066 (*see* William, Kings of England).

William, though conqueror, wisely blended his Norman traditions with the existing institutions of England. In time England, where the seat of power now resided, came to own Normandy. Leaders of Normandy then rebelled and called in the French kings. Disorder and confusion followed until the French king Philip Augustus conquered Normandy from King John of England. The struggle was renewed in the Hundred Years' War (1337–1453), which ended in the expulsion of the English, though at a terrible cost. Thereafter Normandy's history, merging with that of all France, was less eventful.

RUINS OF CHATEAU GAILLARD GUARD THE SEINE



Richard the Lion-Hearted built this rugged castle in 1197 to defend his Normandy against the French kings. It was conquered in 1204, five years after his death, and destroyed in 1603. The village is one of twin towns called Les Andelys.

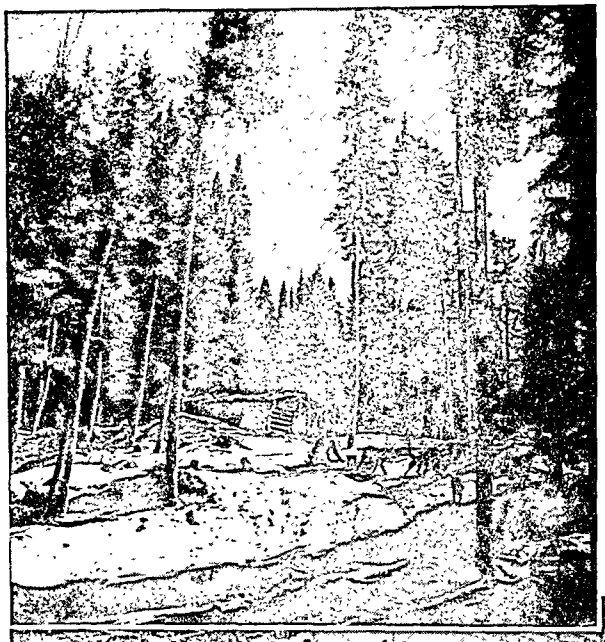
But these early centuries of stirring history left their marks on the land. At Mont St. Michel, the rocky island off the coast, is the famous fortress-abbey where politics and religion were mingled in intrigues and wars. In the ancient city of Caen, on the Orne River, are the Abbey for Men and the Abbey for Women, built by William the Conqueror and his wife Matilda to pacify the pope who disapproved their marriage. Near Caen is placid little Bayeux, where is kept the famous Bayeux "tapestry" depicting in embroidery the incidents in the Norman conquest of England. The most historic city in Normandy, however, is Rouen, on the Seine, the ancient stronghold of the Northmen. Here a mosaic in the sidewalk shows where Joan of Arc was burned at the stake. Here too is a fine Gothic cathedral, in which Henry II of England lies buried and where also is entombed the lion heart of his son Richard I.

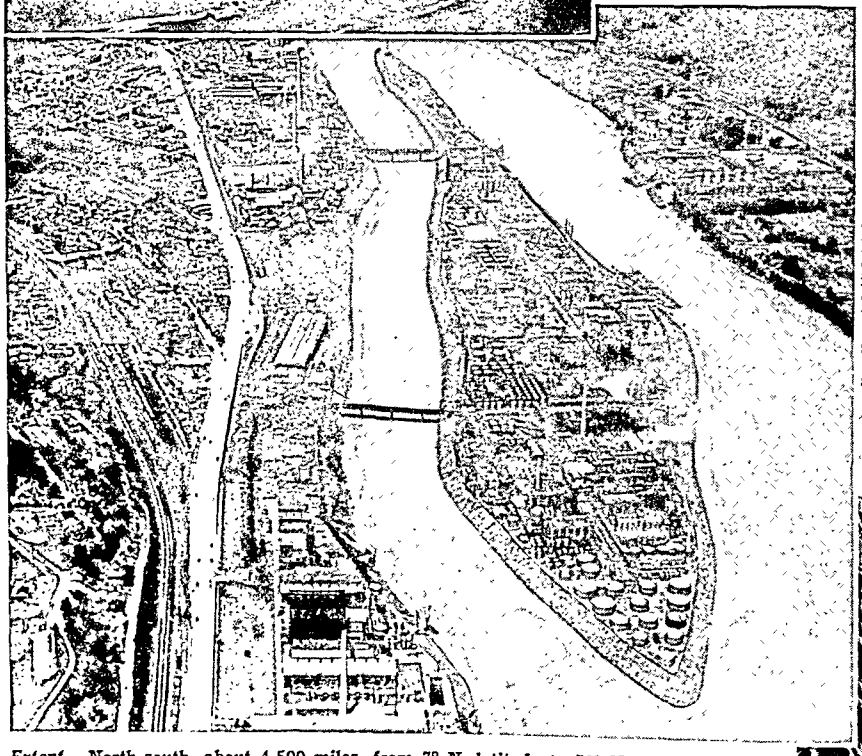
Ports, Products, and People

Normandy has some of the finest harbors in France. Among them are Le Havre at the mouth of the Seine; Cherbourg, at the tip of the peninsula of Cotentin; and Dieppe, in the northeast. The region is famous for its cider and its fine textiles and laces.

The people of this old province are mostly tall, blue-eyed, and fair-haired, showing their descent from the Northmen. They are among the most hardy and industrious inhabitants of France.

The WEALTH *and* VARIETY *of* NORTH AMERICA





NORTH AMERICA. The discovery of North America was one of mankind's greatest pieces of good fortune. When Columbus reached the New World in 1492, civilization was old in Europe and Asia. Fertile lands were crowded. Peasants tilled the soil of their lords without hope of owning land of their own.

Yet North America—vast and rich—lay almost unoccupied by man. The American Indians were there, it is true. But there were only about 5 million in an area of more than 9 million square miles. Most of them lived in the warmer portions. North of modern Mexico, the wilderness held less than a million and a half people. They lived chiefly by hunting and fishing. They had cleared little of the magnificent forest for farming and they had left untouched the wealth of minerals. Only the most advanced Indians south of the Rio Grande made even moderate use of the metals and croplands.

This big, empty land was ideal for European people. Much of it lay in the middle latitudes which are best for white men. The soil and climate were excellent for raising the plants and animals which Europeans used. They also found many valuable new food plants such as corn. Vast forests along the Atlantic coast provided timber for homes,

The wealth and variety of resources in North America offer almost every occupation. Here (top) a man traps furs in Canada's evergreen forest. Another (bottom) cuts sugar cane on a tropical plantation. Between these extremes, millions do other jobs. Thousands work in the huge chemical plant (middle). It is on an island in the Kanawha River near Charleston, W. Va.

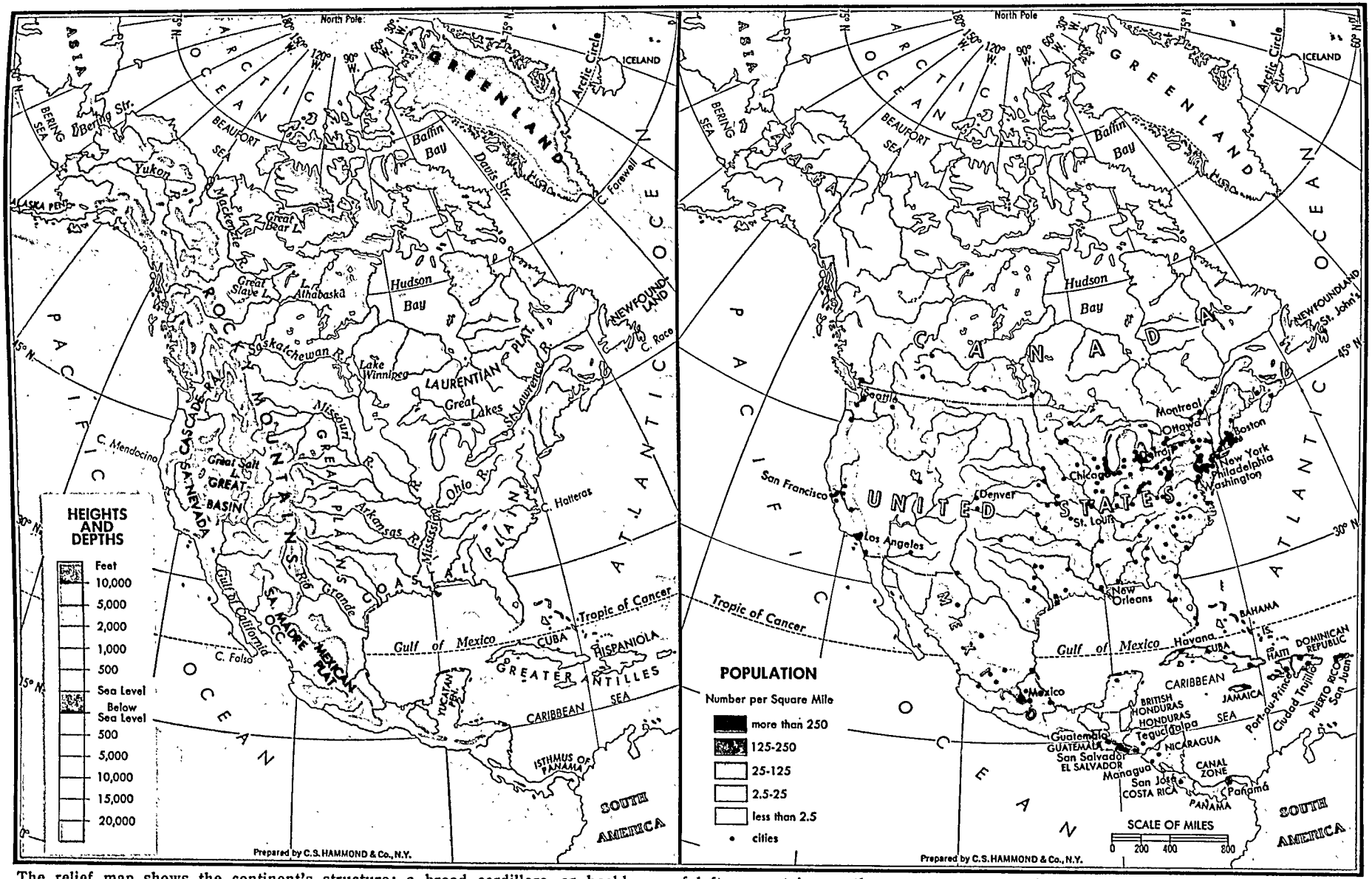


Extent.—North-south, about 4,500 miles, from 7° N. latitude to 72° N. (mainland), or 85° N. (Greenland). East-west, about 3,000 miles, from 55° 38′ W. longitude to 168° W. (mainland); or from 15° W. to 173° E. (with Greenland and Aleutian Islands). Estimated area, about 9,400,000 square miles. Population, about 216,000,000.

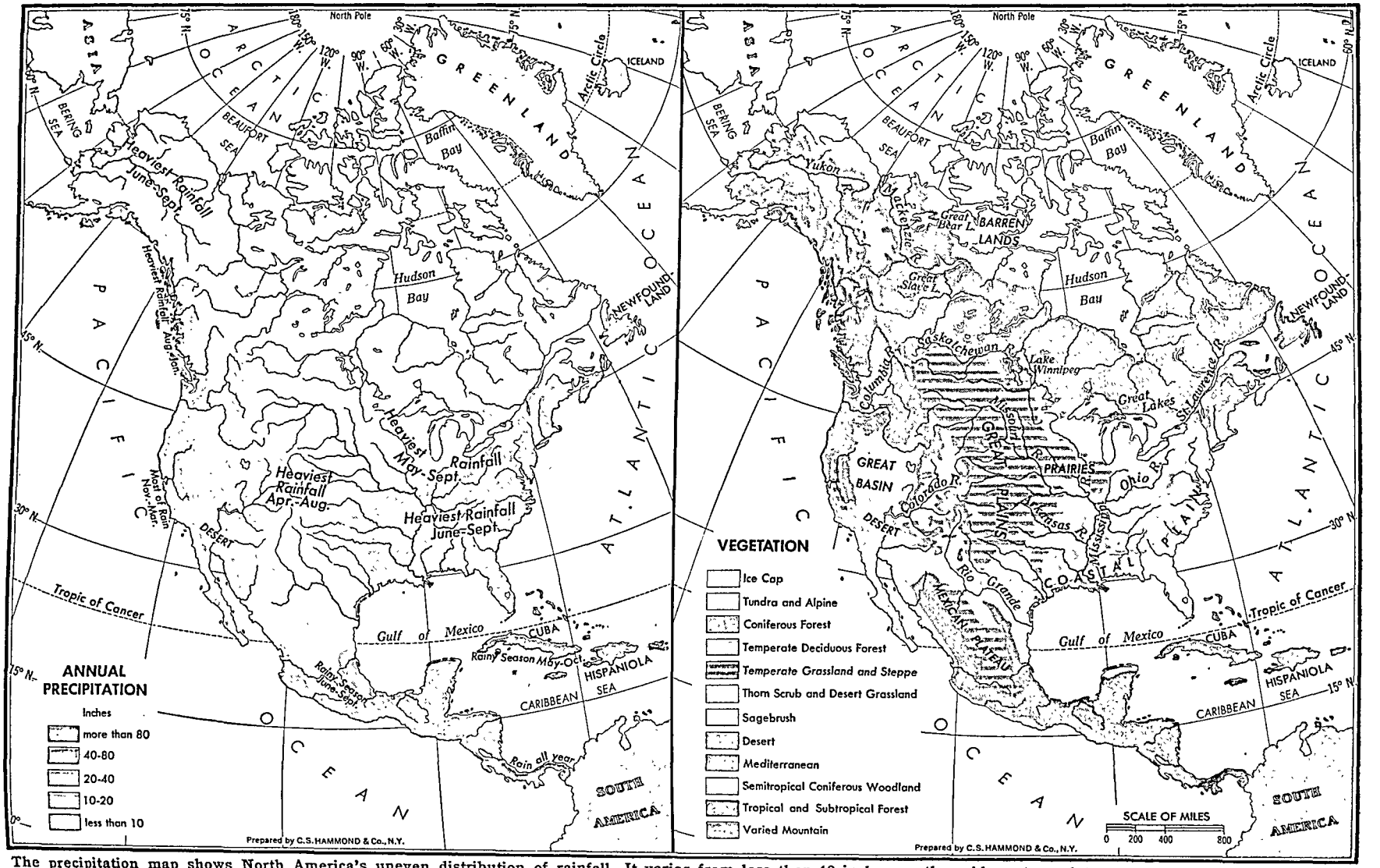
Mountains.—On the east the Laurentian Plateau and the Appalachian Highlands (highest peak, Mount Mitchell, 6,684 feet). On the west the Cordilleran system (highest peak in Alaska, Mount McKinley, 20,269 feet; in Canada, Mount Logan, 19,850 feet; in the United States, Mount Whitney, 14,495 feet; in Mexico, Mount Orizaba, 18,700 feet).

Rivers and Lakes.—Rivers: Missouri-Mississippi (3,988 miles), Mackenzie (2,400), Yukon (1,800), Rio Grande (1,800), Colorado (1,650), Nelson (1,600), Columbia (1,214), St. Lawrence (740). Lakes: Great Lakes (Superior, Michigan, Huron, Erie, Ontario), Great Bear, Winnipeg, Great Slave, Nicaragua, Great Salt.

Political Divisions.—United States (including Alaska, Canal Zone, Puerto Rico, and Virgin Islands); Canada; Mexico; Central American Republics (Guatemala, Honduras, Nicaragua, El Salvador, Costa Rica, and Panama); Cuba; Haiti; Dominican Republic; British possessions (British Honduras, Jamaica, Bahamas, Bermuda, and other islands); French and Dutch islands; Greenland, part of the Danish kingdom.



The relief map shows the continent's structure: a broad cordillera, or backbone, of lofty mountains on the west, a vast central plain, and lower eastern ranges sloping to Coastal Plains. The population map reveals that few people live in the cold, dry, and rugged areas, while the industrial east and the tropical islands are most crowded.



The precipitation map shows North America's uneven distribution of rainfall. It varies from less than 10 inches on the arid western plateaus to more than 80 in the path of wet sea winds. The map at the right reveals the variety of vegetation zones produced by the continent's great contrasts in temperature and rainfall conditions.

shipbuilding, and other uses. Minerals lay in enormous variety and abundance beneath the surface.

Geographic Features of North America

THE CONTINENT contains about one-sixth of the world's land area. Only two other continents, Asia and Africa, are larger. And the value of the land is enhanced by its favorable location with respect to climate.

From south to north the continent lies between 7° and 85° N. latitude; that is, it extends almost from the equator to the North Pole. But most of the land lies in the middle latitudes. The broadest east-west span is between the 45th and 50th parallels, just about halfway between the equator and pole. Here the continent stretches more than one-sixth of the way around the earth.

Good harbors on the adjoining oceans provide easy contact with the rest of the world. Ships that cross the north Atlantic Ocean from Europe find excellent harbors along the eastern shores. In the southeast, the Gulf of Mexico and the Caribbean Sea afford a fine ocean highway to rich tropical islands and South America. The western coast has several fine harbors on the wide north Pacific.

A Broad, Fertile Central Plain

At the heart of the continent a broad central lowland sweeps from the Arctic Ocean to the Gulf of Mexico. At its center, it is about 1,500 miles wide. From the Gulf to the northern limits of agriculture it extends some 1,700 miles. Its expanse is broken by the Black Hills and the Ozark-Ouachita Plateau.

This huge sweep of plain offers the kind of land that men have coveted in every age and country. In the eastern portion, ample rainfall produces grain enough to feed most of the continent and a surplus for shipment abroad. Its drier Great Plains grasslands support vast herds of stock.

Western Mountains and Plateaus

Mountains border the Central Plains. To the west is a broad, rugged system of high ranges which are known collectively as the Cordilleras. It cuts through the continent from Alaska down through Central America and is six hundred miles wide at its greatest breadth. The eastern portion is a chain of lofty, rugged ranges called the Rocky Mountains in Canada and the United States, the Sierra Madre Oriental in Mexico, and the Brooks Range where it curves westward to Bering Strait in northern Alaska.

The western portion consists of another chain of high ranges called the Sierra Madre Occidental in Mexico, the Sierra Nevadas and Cascades in the United States, the Coastal Ranges in Canada, and the Alaska Range in the north. An extension, the Aleutian Range, tapers southwest into the north Pacific, ending in the Aleutian Islands.

Lower mountains bordering the Pacific coast are known as the Coast Ranges in California, where they run parallel to the Sierra Nevadas, and the Olympics in Washington. Northward they are partially submerged and form a chain of rugged islands that enclose an inside passage along the Canadian coast. Between the two main ranges lies a region of basins and plateaus.

Eastern Mountains and Coastal Plain

East of the Central Plains rise lower, weathered uplands—the wide, rock-ribbed Laurentian Plateau, or Canadian Shield, in eastern Canada, and the Appalachian system, which stretches southwest from Newfoundland to Alabama. From the southeastern slope of this mountain backbone, rolling piedmont hills descend to a level Coastal Plain along the Atlantic. This margin merges into the eastern end of the Coastal Plain on the Gulf of Mexico.

The greater part of the mountainous areas in both the east and the west is too rough and steep for extensive farming. But the mountains hold uncounted wealth in minerals and timber, and provide wide ranges for stock. Many river valleys are broad and level enough for farming. The highlands of Mexico and Central America also have productive and densely settled valleys and plateaus.

The rich continent has its wastelands. In the north, vast stretches are frozen much of the year. But part of the belt that is too cold for agriculture bears the largest evergreen forest in the world, and precious metals are torn from the icy earth. Much of the plateau and basin between the Rockies and the Sierras is too dry for normal cultivation. But this desert holds veins of rich minerals. Where mountain rivers irrigate the soil it bears lush crops.

Despite the areas that are too rugged, too dry, or too cold for farming, it is estimated that from a third to a half of the continent is excellent farming land. One-fifth bears valuable forests, and perhaps a fourth furnishes grass for stock.

How the Lakes and Rivers Serve the People

Magnificent rivers and lakes drain North America. The giant Mississippi-Missouri River and its many important tributaries drain most of the central lowlands and carry grain and manufactured products south to the Gulf. The Great Lakes—largest body of fresh water in the world—join with the broad St. Lawrence River to float iron ore, grain, and other bulky produce of the interior eastward to the Atlantic.

Shorter rivers in the Appalachians have cut gaps in the ranges. In colonial times they gave settlers routes for moving west. Today their valleys serve as highway and railway routes. Power from mountain streams helped to develop this region into the busiest industrial section of the continent. In the central lowlands, the close network of roads and railways does not depend upon valley routes. But in the Cordilleras, engineers have pushed transcontinental routes through the passes and valleys to the Pacific.

The leading western rivers are important for irrigation and power. The Columbia-Snake, the Colorado, the Sacramento-San Joaquin, and Fraser flow into the Pacific, while the Rio Grande makes its way to the Gulf of Mexico. The two great rivers of the Arctic region—the Mackenzie and the Yukon—lie icebound two-thirds of the year. The mountain-born rivers of Mexico and Central America plunge toward the ocean

through deep canyons. None is long or navigable far from its mouth. (For a map of the leading North American river basins, *see* United States.)

Varied Climates of the Continent

THE continent's great extent from the Arctic to the Tropics provides every type of climate found anywhere (*see* Climate; Rainfall). January temperatures range from a mean of —40° F. on Greenland's ice cap to between 64° and 75° in the tropics. The growing season increases from a few days of 24-hour sunshine along the Arctic coast to year-around frostless weather in the south.

Great differences in altitude also cause wide variations in temperature. A mile's rise in altitude lowers the temperature about as much as does a move 900 miles northward. Las Vegas in mountainous New Mexico has about the same mean annual temperature as Davenport, Iowa, about 450 miles farther north. The highest mountaintops in North America have Arctic temperatures and year-around snow fields.

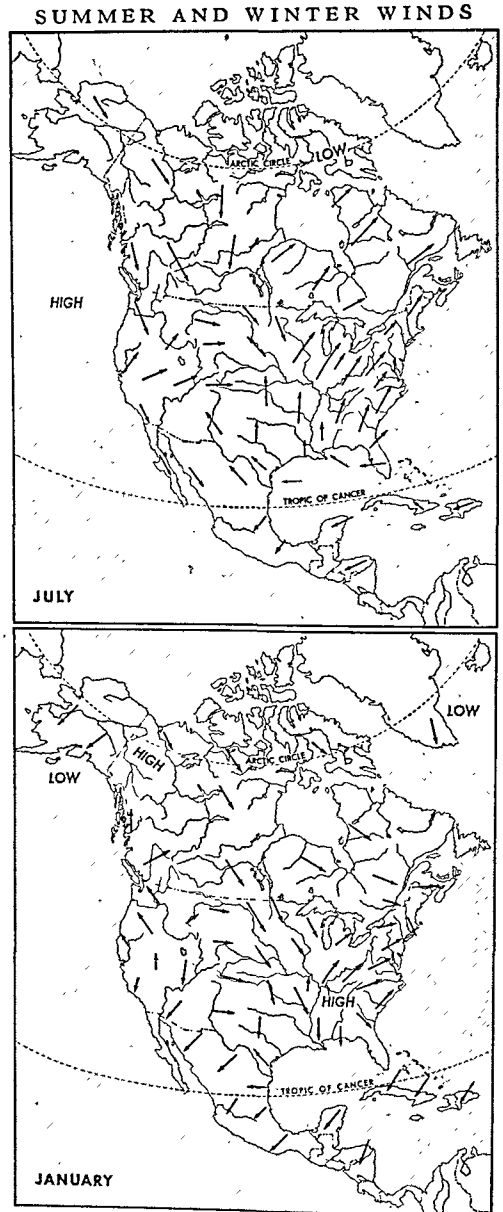
The Climate-Making Winds

Another important factor in making climate is the array of prevailing winds. The tropical portions of the continent and the West Indies lie in the zone of the trade winds. They blow from the northeast in winter and tend to become east and southeast breezes in summer.

The broad portion of the continent has prevailing westerly winds—that is, a general movement of the atmosphere from west to east. This drift carries cyclonic disturbances which act like huge whirlpools, several hundred miles across. These disturbances bring frequent change from stormy weather to fair and cause shifts in the wind as they pass eastward (*see* Winds).

These cyclonic storms are also subject to seasonal influences. In summer, the oceans around the continent are cooler than the land, and air pressures over them tend to be correspondingly higher. The prevailing summer winds blow from these "highs" over the North Pacific and from the region of the Gulf of Mexico and Caribbean Sea. The North Pacific "high" projects cool air eastward toward the interior, but often it does not get beyond the Rockies. The Gulf-Caribbean "high" sends warm air over the eastern two-thirds of the continent. Sluggish "highs" over the Atlantic cause long, hot spells by keeping heated air from moving eastward out to sea.

SUMMER AND WINTER WINDS



On these maps of the prevailing winds of January and July, the arrows show the most frequent movement of the air. Notice that the winds tend to shift from generally southwest and south in summer to generally northwest and west in winter, as explained elsewhere on this page.

In winter the cyclonic disturbances are shaped by prevailing winds from the northwest and north. Heavy masses of polar air build up in the almost sunless winters of northern Canada. From time to time they sweep from the Mackenzie Valley "high" down into the interior lowlands, sometimes reaching the Gulf coast. As the cold wave drives forward, temperatures may drop 60 degrees in a day.

Mountains Block Winds

The location of the continent's mountain barriers also affect its climate. The prevailing westerly winds bring moist breezes from the Pacific to the northwest coast. They prevent extremes of heat and cold and bring heavy rains. The climate resembles that of Europe's western coast.

But this tempering influence is lost as the winds are forced upward by the mountains. The interior suffers the extremes of heat and cold characteristic of continental climates. Temperatures on the Central Plains may vary more than 100 degrees between the greatest winter cold and the summer heat.

Regions of Meager and Abundant Rainfall

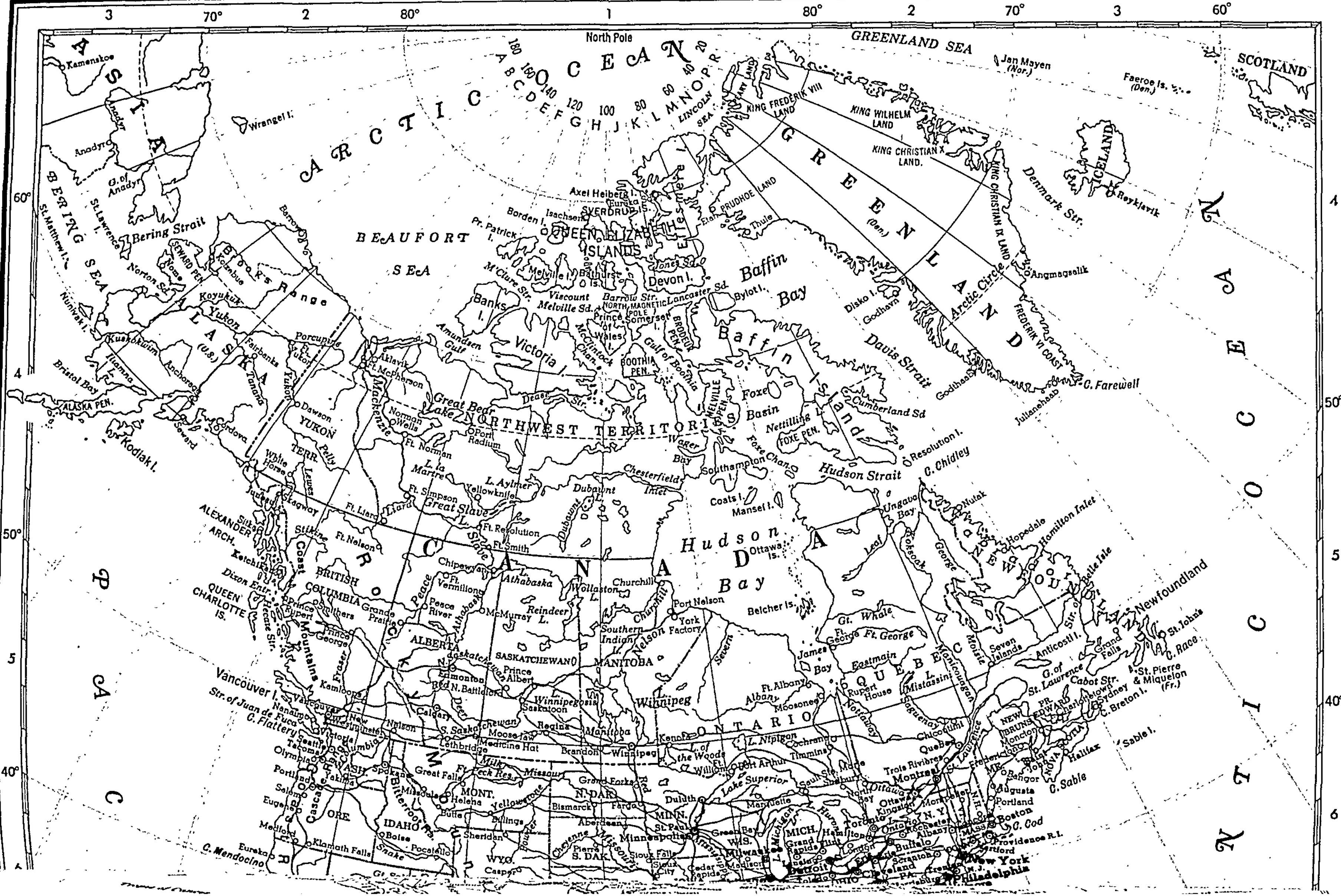
The rain-bearing westerly winds drench the north Pacific coast but carry little of their moisture east of the Cordilleran barrier. Less than five inches fall annually in parts of the intermountain plateaus, and these areas are true desert. Most of the snow and rain that fall over central and eastern North America comes from the humid air drawn in from the Gulf by cyclonic activity.

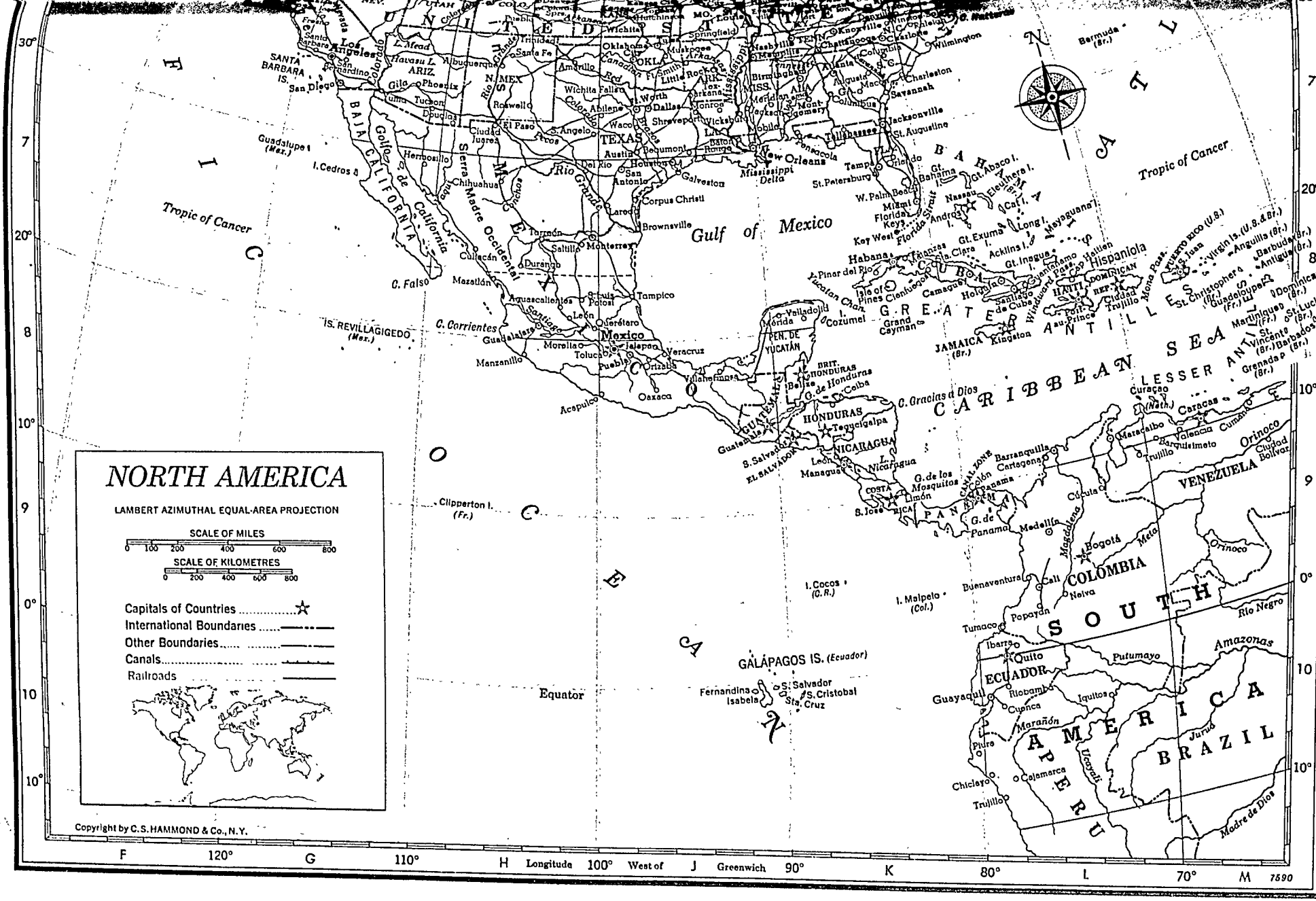
Rainfall in the Gulf area is abundant—an average of some 50 inches annually. It decreases northward to about 10 inches in the cold regions of northern Canada. It also falls off sharply from the Cordilleras eastward, to the region (roughly east of the 100th meridian) where cyclonic storms draw moisture from the south. The Great Plains receive less than 20 inches of rain a year.

NORTH AMERICA*

Aberdeen, S. Dak. 21,051 J 5
Abilene, Tex. 45,570 J 6
Acapulco, Mex. 28,790 H 8
Acklins (isl.), Bah. Is. 1,744 L 7
Aguascalientes, Mex. 93,432 H 7
Alabama (state), U. S. 3,061,743 K 6
Alabama (river), U. S. K 6
Alaska (pen.), Alaska C 4
Alaska 128,643 C 3
Albany (river), Can. K 4
Albany, N. Y. 134,995 L 5
Alberta (prov.), Can. 939,501 G 4
Albuquerque, N. Mex. 96,815 H 6
Alexander (archipelago), Alaska E 4
Amarillo, Tex. 74,246 H 6
Amundsen (gulf), Can. F 2
Anchorage, Alaska 11,254 C 3
Andros (isl.), Bah. Is. 6,718 L 7
Angmagssalik, Greenland P 3
Anguilla (island), L. Antilles 5,037 M 8
Anticosti (isl.), Can. 424 M 5
Antigua, W. Indies 41,757 M 8
Antilles, Greater (islands), W. Indies 14,686,446 L 8
Antilles, Lesser (islands), W. Indies 1,833,000 M 8
Arctic Ocean B 2
Arizona (state), U. S. 749,587 G 6
Arkansas (state), U. S. 1,909,511 J 6
Arkansas (river), U. S. J 6
Athabaska (river), Can. G 4
Athabaska (lake), Can. H 4
Atlanta, Ga. 331,314 K 6
Augusta, Ga. 71,508 K 6
Augusta, Maine 20,913 M 5
Austin, Tex. 132,459 J 6
Axel Heiberg (isl.), Can. H 1
Aylmer (lake), Can. G 3
Baffin (bay) M 2
Baffin (island), Can. L 2
Bahama Is., W. Indies 76,000 L 7
Baja California (pen.), Mex. 287,308 G 7
Baltimore, Md. 949,708 L 6
Bangor, Maine 31,558 M 5
Banks (island), Can. F 2
Barbados, W. Indies 192,800 M 8
Barbuda (isl.), L. Antilles 979 M 8
Barrow, Alaska 951 C 2
Barrow (strait), Can. J 2
Bathurst (island), Can. H 2
Baton Rouge, La. 125,629 J 6
Beaufort (sea) D 2
Beaumont, Tex. 94,014 J 6
Belcher (islands), Can. K 4
Belize (cap.), Br. Hond., 21,886 K 8
Belle Isle (strait), Can. N 4
Bering (sea) A 3
Bering (strait) B 3
Bermuda Is., 37,403 M 6
Billings, Mont. 31,834 H 5
Birmingham, Ala. 326,037 K 6
Bismarck, N. Dak. 18,640 H 5
Bitterroot (mt. range), U.S. G 5
Boise, Idaho 34,393 G 5
Boothia (gulf), Can. K 3
Boothia (pen.), Can. J 2
Borden (island), Can. G 2
Boston, Mass. 801,444 M 5
Boulder, Colo. 19,999 H 5
Brandon, Man. 20,598 H 5
Brazos (river), U. S. J 6
Bristol (bay), Alaska B 4
British Columbia (prov.), Can. 1,165,210 F 4
British Honduras 59,220 K 8
Brodeur (pen.), Can. K 2
Brooks (mt. range), Alaska C 3
Brownsville, Tex. 36,066 J 7
Buffalo, N. Y. 580,132 L 5
Butte, Mont. 33,251 G 5
Bylot (island), Can. L 2
Cabot (strait), Can. N 5
Calgary, Alta. 129,060 G 4
California (gulf), Mex. G 7
California (state), U.S. 10,586,223 F 6
Camagüey, Cuba †204,254 L 7
Canada 14,009,429 J 4
Canadian (river), U. S. J 6
Canal Zone 52,822 L 8
Cap Haitien, Haiti 24,957 L 7
Cape Breton (island), Can. 157,696 N 5
Caribbean (sea) L 8
Carson City, Nev. 3,082 G 6
Cascade (mt. range), U.S. F 5
Casper, Wyo. 23,673 H 5
Cat (isl.), Bah. Is. 3,870 L 7
Cedar Rapids, Iowa 72,296 J 5
Cedros (island), Mex. 374 G 7
Charleston, S.C. 70,174 L 6
Charleston, W.Va. 73,501 L 6
Charlotte, N.C. 134,042 L 6
Charlottetown, P.E.I. 15,887 M 5
Chattanooga, Tenn. 131,041 K 6
Chesapeake (bay), U.S. L 6
Chesterfield (inlet), Can. J 3
Cheyenne, Wyo. 31,935 H 5
Cheyenne (river), U.S. H 5
Chicago, Ill. 3,620,962 J 5
Chicoutimi, Que. 23,216 L 5
Chidley (cape), Can. M 3
Chihuahua, Mex. 86,962 H 7
Churchill (river), Can. J 4
Churchill, Man. 500 J 4
Cienfuegos, Cuba †97,658 K 7
Cincinnati, Ohio 503,998 K 6
Ciudad Juárez, Mex. 122,598 H 6
Ciudad Trujillo (cap.), Dom. Rep. 181,553 M 8
Cleveland, Ohio 914,808 L 5
Clipperton (island) H 8
Coast (mts.), Can. F 4
Coast (mt. range), U.S. F 5
Coats (island), Can. K 3
Cochrane, Ont. 3,401 K 5
Cocos (island), C. R. K 9
Cod (cape), U. S. M 5
Colón, Panama 52,204 L 9
Colorado (state), U. S. 1,325,089 H 6
Colorado (river), U.S. H 6
Colorado (river), U.S. G 6
Colorado Springs, Colo. 45,472 H 6
Columbia, S. C. 86,914 K 6
Columbia (river), U. S. G 5
Columbus, Ga. 79,611 K 6
Columbus, Ohio 375,901 K 6
Conchos (river), Mex. H 7
Concord, N.H. 27,988 L 5
Connecticut (state), U.S. 2,007,280 L 5
Cordova, Alaska 1,165 D 3
Corpus Christi, Tex. 108,287 J 7
Corrientes (cape), Mex. H 7
Costa Rica 800,875 K 8
Cozumel (island), Mex. 2,905 K 7
Cuba, W. Indies 5,853,898 L 7
Culiacán, Mex. 48,983 H 7
Cumberland (sound), Can. M 3
Curaçao, Neth. Ant. (island) 95,195 M 8
Dallas, Tex. 434,462 J 6
Danville, Va. 35,066 K 6
Davis (strait) N 3
Dawson, Yukon 783 E 3
Dayton, Ohio 243,872 K 6
Dease (strait), Can. H 3
Del Rio, Tex. 14,211 H 7
Delaware (state), U. S. 318,085 L 6
Denmark (strait) R 3
Denver, Colo. 415,786 H 5
Des Moines, Iowa 177,965 J 5
Detroit, Mich. 1,849,568 K 5
Devon (island), Can. K 2
Disko (island), Greenland N 2
District of Columbia, U.S. 802,178 L 6
Dixon Entrance (strait) E 4
Dominica, W. Indies 47,624 M 8
Dominican Republic, W. Indies 2,135,872 L 8
Douglas, Ariz. 9,442 G 6
Dover, Del. 6,223 L 6
Dubawnt (river), Can. H 3
Dubawnt (lake), Can. H 3
Duluth, Minn. 104,511 J 5
Durango, Mex. 59,498 H 7
Eastmain (river), Can. L 4
Edmonton, Alta. 159,631 G 4
El Paso, Tex. 130,485 H 6
El Salvador 1,855,917 J 8
Eleuthera (island), Bah. Is. 6,430 L 7
Elko, Nev. 5,393 G 5
Ellesmere (island), Can. K 2
Erie (lake) K 5
Erie, Pa. 130,803 L 5
Etah, Greenland M 2
Eugene, Ore. 35,879 F 5
Eureka, Calif. 23,058 F 5
Eureka Sound, N.W. Terr. K 1
Evansville, Ind. 128,636 K 6
Fairbanks, Alaska 5,771 D 3
Falso (cape), Mex. G 7
Farewell (cape), Greenland O 4
Fargo, N. Dak. 38,256 J 5
Flattery (cape), U. S. F 5
Flint, Mich. 163,143 K 5
Florida (state), U.S. 2,771,305 K 7
Florida (strait) K 7
Florida Keys, U. S. K 7
Fort Albany, Ont. K 4
Fort Chipewyan, Alta. G 4
Fort George (river), Can. L 4
Fort George, Que. L 4
Fort Liard, N.W. Terr. F 3
Fort McPherson, N.W. Terr. F 3
Fort Nelson, Br. Col. 350 F 4
Fort Resolution, N.W. Terr. H 3
Fort Simpson, N.W. Terr. G 3
Fort Smith, N.W. Terr. 250 H 3
Fort Smith, Ark. 47,942 J 6
Fort Vermilion, Alta. G 4
Fort William, Ont. 34,947 J 5
Fort Worth, Tex. 278,778 J 6
Fort Yukon, Alaska 446 D 3
Foxe (channel), Can. K 3
Foxe (basin), Can. L 3
Foxe (pen.), Can. L 3
Frankfort, Ky. 11,916 K 6
Fraser (river), Can. F 4
Fredericton, N. B. 16,018 M 5
Frederik VI Coast (region), Greenland O 3
Fresno, Calif. 91,669 F 6
Galveston, Tex. 66,568 J 7
Garry (lake), Can. J 3
Gary, Ind. 133,911 K 5
George (river), Can. M 4
Georgia (state), U. S. 3,444,578 K 6
Gila (river), U. S. G 6
Godhavn, Greenland 319 N 3
Godthaab (cap.), Greenland 1,021 N 3
Gracias a Dios (cape), Cent. Amer. K 8
Grand Bahama (island), Bah. Is. 2,333 L 7
Grand Cayman (island), Jam. 5,600 K 8
Grand Falls, Newfld. 5,508 N 5
Grand Forks, N. Dak. 26,836 J 5
Grand Island, Nebr. 22,682 J 5
Grand Rapids, Mich. 176,515 K 5
Grande Prairie, Alta. 2,664 F 4
Great Abaco (isl.), Bah. Is. 3,461 L 7
Great Bear (lake) G 3
Great Exuma (island), Bah. Is. 3,784 L 7
Great Falls, Mont. 39,214 G 5
Great Inagua (island), Bah. Is. 890 L 7
Great Salt (lake), U. S. G 5
Great Slave (lake), Can. G 3
Great Whale (river), Can. L 4
Green Bay, Wis. 52,735 K 5
Greenland 21,412 O 2
Greenland (sea) T 2
Grenada, W. Indies 72,387 M 8
Guadalajara, Mex. 378,423 H 7
Guadalupe (island), Mex. 265 G 7
Guadeloupe, W. Indies 278,464 M 8
Guantánamo, Cuba †124,428 L 7
Guatemala (cap.), Guat. 284,233 J 8
Guatemala 2,788,122 J 8
Habana (Havana) (cap.), Cuba †787,448 K 7
Haiti, W. Indies 3,111,973 L 8
Halifax, N. S. 85,589 M 5
Hamilton (inlet), Can. N 4
Hamilton, Ont. 208,321 K 5
Harrisburg, Pa. 89,544 L 5
Hartford, Conn. 177,397 L 5
Hatteras (cape), U. S. L 6
Havana (Habana) (cap.), Cuba 787 448 K 7
Havasu (lake), U. S. G 6
Hecate (strait), Can. E 4
Helena, Mont. 17,581 G 5
Hermosillo, Mex. 43,522 G 7
Hispaniola (island), W. Indies M 7
Holguín, Cuba †224,579 L 7
Honduras (gulf), Cent. Am. K 8
Honduras 1,505,465 K 8
Hopedale, Newf. 167 N 4
Houston, Tex. 596,163 J 7
Hudson (bay), Can. K 3
Hudson (strait), Can. L 3
Huron (lake) K 5
Hutchinson, Kans. 33,575 J 6
Idaho (state), U. S. 588,637 G 5
Iliamna (lake), Alaska C 4
Illinois (state), U. S. 8,712 176 K 5
Indiana (state), U. S. 3,934,224 K 6
Indianapolis, Ind. 427,173 K 5
Iowa (state), U. S. 2,621,073 J 5
Isachsen, N.W. Terr. H 2
Jackson, Miss. 98,271 K 6
Jacksonville, Fla. 204,517 L 6
Jalapa, Mex. 51,123 J 8
Jamaica, W. Indies 1,374,000 L 8
James (bay), Can. K 4
Jefferson City, Mo. 25,099 J 6
Jones (sound), Can. K 2
Juan de Fuca (strait) F 5
Julianehaab, Greenland 954 O 3
Juneau (cap.), Alaska 5,956 E 4
Kamloops, Br. Col. 8,099 F 4
Kansas (state), U. S. 1,905,299 J 6
Kansas (river), U. S. J 6
Kansas City, Kans. 129,553 J 6
Kansas City, Mo. 456,622 J 6
Kenora, Ont. 8,695 J 4
Kentucky (state), U. S. 2,944,806 K 6
Ketchikan, Alaska 5,305 E 4
Key West, Fla. 26,433 K 7
King Christian IX Land (region), Greenland P 3
King Christian X Land (region), Greenland P 2
King Frederik VIII Land (region), Greenland P 1
King Wilhelm Land (region), Greenland R 2
Kingston (cap.), Jam. 109,056 L 8
Kingston, Ont. 33,459 L 5
Klamath Falls, Ore. 15,875 G 5
Knoxville, Tenn. 124,769 K 6
Kodiak (island), Alaska C 4
Koksoak (river), Can. M 4
Kotzebue, Alaska 623 C 3
Koyukuk (river), Alaska C 3
Kuskokwim (river), Alaska C 3
La Ceiba, Hond. 16,645 K 8
La Martre (lake), Can. G 3
Labrador, Nfld., Can., 5,525 M 4
Lake of the Woods (lake) J 5
Lancaster (sound), Can. K 2
Lansing, Mich. 92,129 K 5
Laredo, Tex. 51,910 J 7
Leaf (river), Can. L 4
León, Mex. 122,585 H 7
León, Nic. 30,544 K 8
Lethbridge, Alta. 22,947 G 5
Lexington, Ky. 55,534 K 6
Liard (river), Can. F 3
Limón, C. R. 11,310 K 9
Lincoln (sea) N 1
Lincoln, Nebr. 98,884 J 5
Little Rock, Ark. 102,213 J 6
London, Ont. 95,343 K 5
Long (island), Bah. Is. 4,564 L 7
Los Angeles, Calif. 1,970,358 G 6
Louisiana (state), U. S. 2,683,516 J 6
Louisville, Ky. 369,129 K 6
Lynchburg, Va. 47,727 L 6
Mackenzie (river), Can. F 3
Macon, Ga. 70,252 K 6
Madison, Wis. 96,056 K 5
Madre Occidental (mt. range), Mexico H 7
Maine (state), U. S. 913,774 M 5
Managua (cap.), Nic. 109,352 K 8
Manikuakan (river), Can. M 4

*All population figures are taken from the latest official census or estimate available. For date and source of a population figure, *see* article on the appropriate country. †Includes suburbs.


ARCTIC OCEAN
North Pole
GREENLAND SEA
GREENLAND
(Den.)
ICELAND
Reykjavik
SCOTLAND
ASIA
BERING SEA
Bering Strait
ALASKA
(U.S.)
BEAUFORT SEA
Baffin Bay
Davis Strait
Baffin Island
Hudson Strait
Hudson Bay
CANADA
NORTHWEST TERRITORIES
YUKON TERR.
BRITISH COLUMBIA
ALBERTA
SASKATCHEWAN
MANITOBA
ONTARIO
QUEBEC
NEWFOUNDLAND
QUEEN ELIZABETH ISLANDS
Victoria I.
Great Bear Lake
Great Slave L.
L. Winnipeg
Coast Mountains
Vancouver I.
PACIFIC
ATLANTIC OCEAN
New York
Philadelphia
Boston
Detroit
Montreal
Quebec
Winnipeg
Seattle
Portland


NORTH AMERICA
LAMBERT AZIMUTHAL EQUAL-AREA PROJECTION
SCALE OF MILES
0 100 200 400 600 800
SCALE OF KILOMETRES
0 200 400 600 800
Capitals of Countries
International Boundaries
Other Boundaries
Canals
Railroads
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UNITED STATES
MEXICO
CANADA
Gulf of Mexico
CARIBBEAN SEA
GREATER ANTILLES
LESSER ANTILLES
BAHAMA IS.
CUBA
HAITI
DOMINICAN REP.
JAMAICA
PUERTO RICO (U.S.)
Hispaniola
Tropic of Cancer
Equator
PACIFIC OCEAN
ATLANTIC OCEAN
GALÁPAGOS IS. (Ecuador)
COLOMBIA
VENEZUELA
ECUADOR
PERU
BRAZIL
SOUTH AMERICA
Amazonas
Orinoco
Río Negro
Rio Grande
Colorado
Mississippi
Mississippi Delta
Sierra Madre Occidental
Sierra Madre Oriental
Golfo de California
BAJA CALIFORNIA
TEXAS
Yucatan Chan.
PEN. DE YUCATÁN
Florida Keys
Windward Pass.
Mona Pass.
Caribbean Sea
Pacific Ocean
Atlantic Ocean
Longitude 100° West of Greenwich
120°
110°
90°
80°
70°
30°
20°
10°
0°
7590

Manitoba (prov.), Can. 776,541 J 4
Manitoba (lake), Can. J 4
Mansel (island), Can. K 3
Manzanillo, Mex. 13,036 H 8
Marquette, Mich. 17,202 K 5
Martinique, W. Indies, 261,595 M 8
Maryland (state), U. S. 2,343,001 L 6
Massachusetts (state), U. S. 4,690,514 L 5
Matanzas, Cuba †82,646 K 7
Mayaguana (isl.), Bah. Is. 591 L 7
Mazatlán, Mex. 41,470 H 7
McClintock (chan.), Can. H 2
M'Clure (strait), Can. G 2
McMurray, Alta. 621 H 4
Mead (lake), U. S. G 6
Medford, Ore. 17,305 F 5
Medicine Hat, Alta. 16,364 H 5
Melville (pen.), Can. K 3
Melville (island), Can. G 2
Memphis, Tenn. 396,000 K 6
Mendocino (cape), U. S. F 5
Mérida, Mex. 144,793 K 7
Meridian, Miss. 41,893 K 6
Mexico (gulf) K 7
México (Mexico City) (cap.), Mex. 2,233,914 J 7
Mexico 25,706,182 H 7
Miami, F a. 249,276 K 7
Michigan (state), U. S. 6,371,766 K 5
Michigan (lake), U. S. K 5
Milk (river), U. S. H 5
Milwaukee, Wis. 637,392 K 5
Minneapolis, Minn. 521,718 J 5
Minnesota (state), U. S. 2,982,483 J 5
Mississippi (state), U. S. 2,178,914 K 6
Mississippi (river), U. S. J 6
Mississippi (delta), U. S. K 7
Missoula, Mont. 22,485 G 5
Missouri (state), U. S. 3,954,653 J 6
Missouri (river), U. S. J 5
Mistassini (lake), Can. L 4
Mobile, Ala. 129,009 K 6
Moisie (river), Can. M 4
Mona (passage) M 8
Moncton, N. B. 27,334 M 5
Monroe, La. 38,572 J 6
Montana (state), U. S. 591,024 H 5
Monterrey, Mex. 331,771 J 7
Montgomery, Ala. 106,525 K 6
Montpelier, Vt. 8,599 L 5
Montreal, Que. 1,021,520 L 5
Moose Jaw, Sask. 24,355 H 4
Moosonee, Ont. 300 K 4
Morelia, Mex. 63,248 H 8
Mosquitos (gulf), Cent. Am. K 8
Muskogee, Okla. 37,289 J 6
Nanaimo, Br. Col. 7,196 F 5
Nashville, Tenn. 174,307 K 6
Nassau (cap.), Bah. Is. 13,231 L 7
Nebraska (state), U. S. 1,325,510 H 5
Nelson, Br. Col. 6,772 G 5
Nelson (river), Can. J 4
Nettilling (lake), Can. L 3
Nevada (state), U. S. 160,083 G 6
New Brunswick (prov.), Can. 515,697 M 5
New Hampshire (state), U. S. 533,242 L 5
New Jersey (state), U. S. 4,835,329 L 5
New Mexico (state), U. S. 681,187 H 6
New Orleans, La. 570,445 K 7
New Westminster, Br. Col. 28,639 F 5
New York (state), U. S. 14,830,192 L 5
New York, N.Y. 7,891,957 L 5
Newfoundland (prov.), Can. 361,416 O 5
Nicaragua (lake), Cent. Am. K 8
Nicaragua 1,057,023 K 8
Nipigon (lake), Can. K 5
Nome, Alaska 1,876 B 3
Norfolk, Va. 213,513 L 6
North Battleford, Sask. 7,473 G 4
North Bay, Ont. 17,944 L 5
North Carolina (state), U. S. 4,061,929 L 6
North Dakota (state), U. S. 619,636 H 5
North Magnetic Pole J 2
North Platte (river), U. S. H 5
North Saskatchewan (river), Canada G 4
Northwest Territories, (terr.), Can. 16,004 H 3
Norton (sound), Alaska B 3
Nottaway (river), Can. L 5
Nova Scotia (prov.), Can. 642,584 M 5
Nunivak (island), Alaska 225 B 4
Nutak, Newf. 66 M 4
Oakland, Calif. 384,575 F 6
Oaxaca, Mex. 46,156 J 8
Ogden, Utah 57,112 G 5
Ohio (state), U. S. 7,946,627 K 5
Ohio (river), U. S. K 6
Oklahoma (state), U. S. 2,233,351 J 6
Oklahoma City, Okla. 243,504 J 6
Olympia, Wash. 15,819 F 5
Omaha, Nebr. 251,117 J 5
Ontario (lake) L 5
Ontario (prov.), Can. 4,597,542 K 4
Oregon (state), U. S. 1,521,341 F 5
Orizaba, Mex. 55,522 J 8
Orlando, Fla. 52,367 K 7
Ottawa (river), Can. L 5
Ottawa (islands), Can. K 4
Ottawa (cap.), Canada 202,045 L 5
Panama (gulf), Cent. Am. L 9
Panamá (cap.), Panama 127,874 L 9
Panama 805,285 K 8
Peace (river), Can. G 4
Peace River, Alta. 1,672 G 4
Peary Land (region), Greenland P 1
Pecos (river), U. S. H 6
Pelly (river), Can. E 3
Pennsylvania (state), U. S. 10,498,012 L 5
Pensacola, Fla. 43,479 K 7
Peoria, Ill. 111,856 J 5
Philadelphia, Pa. 2,071,605 L 6
Phoenix, Ariz. 106,818 G 6
Pierre, S. Dak. 5,715 H 5
Pinar del Río, Cuba †93,287 K 7
Pines (island), Cuba 9,812 K 7
Pittsburgh, Pa. 676,806 K 5
Platte (river), U. S. J 5
Pocatello, Idaho 26,131 G 5
Porcupine (river), Alaska D 3
Port Arthur, Ont. 31,161 K 5
Port-au-Prince (cap.), Haiti 142,840 L 8
Port Nelson, Man. J 4
Portland, Maine 77,634 M 5
Portland, Ore. 373,628 F 5
Porto Rico (Puerto Rico), W. Indies 2,210,703 M 8
Powder (river), U. S. H 5
Prince Albert, Sask. 17,149 H 4
Prince Edward I. (prov.), Can. 98,429 M 5
Prince George, Br. Col. 4,703 F 4
Prince of Wales (isl.), Can. J 2
Prince Patrick (island), Can. F 2
Prince Rupert, Br. Col. 8,546 F 4
Providence, R. I. 248,674 M 5
Prudhoe Land (region), Greenland M 2
Puebla, Mex. 206,840 J 8
Pueblo, Colo. 63,685 H 6
Puerto Rico, W. Indies 2,210,703 M 8
Quebec (prov.), Can. 4,055,681 L 4
Quebec, Que. 164,016 L 5
Queen Charlotte (islands), Can. 2,389 E 4
Queen Elizabeth (isls.) Can. H 2
Querétaro, Mex. 49,428 J 7
Race (cape), Can. N 5
Raleigh, N. C. 65,679 L 6
Red (river), U. S. J 5
Red (river), U. S. J 6
Red Deer (river), Can. G 4
Regina, Sask. 71,319 H 4
Reindeer (lake), Can. H 4
Reno, Nev. 32,497 G 6
Resolution (island), Can. M 3
Revillagigedo (islands), Mex. G 8
Rhode Island (state), U. S. 791,896 M 5
Richmond, Va. 230,310 L 6
Rio Grande (river) H 7
Rochester, N. Y. 332,488 L 5
Rock Springs, Wyo. 10,857 H 5
Rocky (mts.) G 4
Roswell, N. Mex. 25,738 H 6
Rupert House, Que. L 4
Sable (cape), Can. M 5
Sable (island), Can. N 5
Sacramento, Calif. 137,572 F 6
Saguenay (river), Can. L 5
Saint Augustine, Fla. 13,555 L 7
Saint Christopher (island), L. Antilles 29,818 M 8
Saint John, N. B. 50,779 M 5
Saint John's, Newfld. 52,873 N 5
Saint Lawrence (river), Can. L 5
Saint Lawrence (gulf), Can. M 5
Saint Lawrence (isl), Alaska A 3
Saint Louis, Mo. 856,796 J 6
Saint Lucia, W. Indies 70,113 M 8
Saint Matthew (isl.), Alaska A 3
Saint Paul, Minn. 311,349 J 5
Saint Petersburg, Fla. 96,738 K 7
Saint Pierre & Miquelon (*Fr.*), (islands) 4,354 N 5
Saint Vincent, W. Indies 61,647 M 8
Salem, Ore. 43,140 F 5
Salt Lake City, Utah, 182,121 G 5
Saltillo, Mex. 69,874 H 7
Salvador, El 1,855,917 J 8
San Angelo, Tex. 52,093 H 6
San Antonio, Tex. 408,442 J 7
San Bernardino, Calif. 63,058 G 6
San Diego, Calif. 334,387 G 6
San Francisco, Calif. 775,357 F 6
San José (cap.), C. R. 86,718 K 9
San Jose, Calif. 95,280 F 6
San Juan (cap.), P. R. 224,767 M 8
San Luis Potosí, Mex. 126,596 J 7
San Salvador (cap.), El Sal. 161,951 J 8
Santa Barbara, Calif. 44,913 G 6
Santa Barbara (isls.), U.S. F 6
Santa Clara, Cuba †144,630 L 7
Santa Fe, N. Mex. 27,998 H 6
Santiago (river), Mex. H 7
Santiago de Cuba, Cuba, †169,244 L 8
Saskatchewan (prov.), Can. 831,728 H 4
Saskatchewan (river), Can. H 4
Saskatoon, Sask. 53,268 H 4
Sault Sainte Marie, Ont. 32,452 K 5
Savannah, Ga. 119,638 L 6
Savannah (river), U. S. K 6
Scranton, Pa. 125,536 L 5
Seattle, Wash. 467,591 F 5
Seven Islands, Que. 1,866 M 4
Severn (river), Can. K 4
Seward, Alaska 2,114 D 4
Seward (pen.), Alaska B 3
Sheridan, Wyo. 11,500 H 5
Shreveport, La. 127,206 J 6
Sierra Nevada (mt. range), U. S. G 6
Sioux City, Iowa 83,991 J 5
Sioux Falls, S. Dak. 52,696 J 5
Sitka, Alaska 1,985 E 4
Skagway, Alaska 758 E 4
Slave (river), Can. G 3
Smithers, Br. Col. 1,204 F 4
Snake (river), U. S. G 5
Somerset (island), Can. J 2
South Carolina (state), U. S. 2,117,027 K 6
South Dakota (state), U. S. 652,740 H 5
South Platte (river), U. S. H 5
South Saskatchewan (river), Canada G 4
Southampton (isl.), Can. K 3
Southern Indian (lake), Can. J 4
Spokane, Wash. 161,721 G 5
Springfield, Ill. 81,628 J 5
Springfield, Mo. 66,731 J 6
Stikine (river), Can. E 4
Sudbury, Ont. 42,410 K 5
Superior (lake) K 5
Sverdrup (islands), Can. J 2
Sydney, N. S. 31,317 N 5
Tacoma, Wash. 143,673 F 5
Tallahassee, Fla. 27,237 K 6
Tampa, Fla. 124,681 K 7
Tampico, Mex. 94,221 J 7
Tanana (river), Alaska D 3
Tegucigalpa (cap.), Hond. 72,385 K 8
Tennessee (state), U. S. 3,291,718 K 6
Tennessee (river), U. S. K 6
Terre Haute, Ind. 64,214 K 6
Texarkana, Ark. 15,875 J 6
Texarkana, Tex. 24,753 J 6
Texas (state), U. S. 7,711,194 J 6
Thule, Greenland M 2
Timmins, Ont. 27,743 K 5
Toledo, Ohio 303,616 K 5
Toluca, Mex. 52,789 H 8
Topeka, Kans. 78,791 J 6
Toronto, Ont. 675,754 K 5
Torreón, Mex. 128,548 H 7
Trenton, N. J. 128,009 L 5
Trinidad, Colo. 12,204 H 6
Trois Rivières, Que. 46,074 L 5
Tucson, Ariz. 45,454 G 6
Tulsa, Okla. 182,740 J 6
Ungava (bay), Can. M 4
United States 150,697,361 H 6
Utah (state), U. S. 688,862 G 6
Valladolid, Mex. 6,402 K 7
Vancouver, Br. Col. 344,833 F 5
Vancouver (isl.), Can. E 3
Veracruz, Mex. 101,469 J 8
Vermont (state), U. S. 377,747 L 5
Vicksburg, Miss. 27,948 J 6
Victoria, Br. Col. 51,331 F 5
Victoria (island), Can. G 2
Villahermosa, Mex. 33,588 J 8
Virgin Is. (*U.S.*), W. Indies 26,665 M 8
Virgin Is. (*Br.*), W. Indies 6,505 M 8
Virginia (state), U. S. 3,318,680 L 6
Viscount Melville (sound), Canada H 2
Waco, Tex. 84,706 J 6
Wager (bay), Can. K 3
Washington (state), U. S. 2,378,963 F 5
Washington, D. C., (cap.), U.S. 802,178 L 6
West Indies (islands) 16,000,000 L 8
West Palm Beach, Fla. 43,162 K 7
West Virginia (state), U. S. 2,005,552 L 6
White Horse, Yukon 2,594 E 3
Wichita, Kans. 168,279 J 6
Wichita Falls, Tex. 68,042 H 6
Wilmington, N. C. 45,043 L 6
Windward (passage) L 8
Winnipeg (lake), Can. J 4
Winnipeg, Man. 235,710 J 5
Winnipegosis (lake), Can. H 4
Winston-Salem, N. C. 87,811 L 6
Wisconsin (state), U. S. 3,434,575 K 5
Wollaston (lake), Can. H 4
Woods (lake) J 5
Wyoming (state), U. S. 290,529 H 5
Yakima, Wash. 38,486 F 5
Yaqui (river), Mex. H 7
Yellowstone (river), U.S. H 5
York Factory, Man. J 4
Yucatan (channel) K 7
Yucatán (pen.) 750,000 K 8
Yukon (river) C 3
Yukon Territory (terr.), Can. 9,096 E 3
Yuma, Ariz. 9,145 G 6

In the tropical trade-wind belt, windward slopes receive heavy downpours, while lee sides are dry. Southern California and adjacent Mexico receive virtually no summer rain because at that season they lie in the high-pressure belt known as the horse latitudes. In winter, the area along the 30th parallel has prevailing westerly winds and winter rain or snow.

Variety of Natural Growth, Soils, and Crops

Differences in temperature and rainfall bring striking differences in natural vegetation and soils. They also affect crop growing and other uses of the land. The land tends to lack fertility in the hot, wet regions where rain leaches plant food from the soil throughout the year. Intensive evaporation in the desert regions makes many soils alkaline and unfit for use. The most fertile soil covers the heart of the central lowland where rainfall suffices for crops, but is not so heavy that it quickly robs the soil of plant foods and needed minerals. (For a detailed explanation of the continent's soil, *see* Soil.)

Where and How the People Live

THE PEOPLES of North America have made astounding progress in developing the continent's resources and creating strong nations in a few centuries. Harmonious relations across undefended frontiers have set an example of peace to older nations. They have linked the various regions and nations with a gigantic transportation network, and each area profits from sharing its produce with the others.

The people of the leading manufacturing countries, the United States and Canada, had the advantage of developing their industries with tools supplied by the Machine Age. By bold pioneering with the new techniques, they attained an industrial efficiency unmatched abroad.

North Americans were leaders also in creating democratic governments and in achieving personal, religious, political, and economic liberty. The American republics have served as an inspiration to freedom-seeking peoples on every continent. (Separate articles describe the countries, states, provinces, and other territories into which the continent is divided, and tell the history of their achievements.)

How the People Are Distributed

ABOUT 216 million people are scattered unevenly over the continent. The cold north supports the scantiest population. Greenland averages perhaps two or three persons to a hundred square miles, and Labrador four. Alaska has thriving towns where the Japan current warms its coast, but its average population is only about one in every five square miles. The deserts and the rugged mountainous areas are also thinly settled. Nevada averages one and one half persons to the square mile, and Mexico's arid southern half of Lower California about two.

The two most thickly peopled regions of North America offer a striking contrast. One lies in northeastern United States where industrial cities cluster closely together. Here manufacturing and commerce give work to millions and the standard of living is higher than it is on any other continent. The most densely populated states are Rhode Island, with 748.5 persons to the square mile; New Jersey, with 642.8; and Massachusetts, with 596.2.

The second densely populated region is found on certain of the tropical islands in the West Indies. They are even more crowded than the manufacturing states. Barbados has more than 1,160 persons to the square mile. Martinique averages about 616, and Puerto Rico has 644.

These islands can support many people because the hot sun and abundant rain make it easy to grow food crops. Wild palm trees furnish material for the airy houses, and few clothes are needed. But the island farmers make little money and have a meager standard of living (*see* West Indies).

Between these extremes in the density of population, the various parts of the continent differ also in density of settlement, prosperity, and means of livelihood. These differences depend upon the natural resources of the regions and upon the people's skill and enterprise in using them.

North America's physical features divide it into four large natural regions that cut across the boundary lines of nations and states. They are: the Laurentian Plateau, or Canadian Shield; the Appalachian Highlands; the Central Lowlands, or Plains; and the Cordilleras. The Atlantic and Gulf coastal plains form physically distinct regions which lie as a rim along the southeast angle of the continent. But the people's use of the land along this rim resembles their use of the Appalachian Highlands and the central lowlands respectively.

Laurentian Plateau (Canadian Shield)

THE LAURENTIAN PLATEAU—also called the Canadian Shield—occupies two-thirds of Canada. There it forms a broad V around Hudson Bay. The southern edges thrust into the United States near Lake Superior to the west and the Adirondack Mountains in the east.

The glaciers of the Ice Age stripped the land of its soil, laying bare some of the oldest rocks in the world (*see* Geology). There has not been time since the ice retreated to develop efficient river drainage of the northern and western parts. Hence water gathers into a multitude of ponds and lakes, threaded together by a network of sluggish rivers and streams.

Eskimos and Fur Trappers of the North

In the north the shield lies in the tundra region that borders the Arctic coast. Here the bitter cold of the long, dark winters freezes the soil to great depths (*see* Arctic Regions). Only a shallow layer thaws during the few frostless days of summer. The Eskimo inhabitants live by hunting, fishing, and trapping (*see* Eskimos).

South of the tundra stretches a vast evergreen forest. Indian trappers and fur traders bring rich cargoes of animal peltries from these woods as they did in the early days of French occupation (*see* Furs and Fur Trade). Lumbering and pulpwood cutting are other important occupations in the eastern half of the region. But logging is hampered because it is difficult to transport the timber to market across the many bogs, swamps, and small lakes.

In the southeastern part of the region, the surface falls off sharply to the St. Lawrence River, giving a steep drop to the rivers. Thus an ample supply of hydroelectric power is available. Where dams have been built, the power has been used by pulpwood and paper mills and smelters.

Mineral Wealth of the Shield Rocks

The Shield's ancient rocks are rich in minerals. Nickel, copper, platinum, gold, and silver mines cluster between Lake Huron and Hudson Bay. On the far northwestern edge, new gold mines have been opened on the shores of Great Slave Lake. Uranium and radium ores are mined near Great Bear Lake. One of the world's richest iron ranges lies at the southwestern edge of the Shield in Minnesota, and copper veins are worked near by.

Labrador, on the Atlantic fringe of the Shield, has tundra in the north and forests in the south. But long winters, sparse soil, and distance from the settled parts of the continent, have hampered development. The sea's wealth in fish provides almost the only means of livelihood. (*See also* Canada; and articles on the Canadian provinces.)

The Appalachians and the Coastal Plains

The Appalachian Highlands extend from Newfoundland southwestward into Alabama. In the northeast (Nova Scotia and New England) the mountains push down almost to the drowned Atlantic coast. From New York southward, they lie somewhat inland. The eastern slope merges into a belt of rolling land called the Piedmont. Between this and the ocean lies a narrow Coastal Plain.

In this region, the mountains consist of roughly parallel ridges. The most prominent systems are called the Blue Ridge, the Great Smokies, and the Black Mountains. On the northwest side of the mountain system, a broad plateau slopes down to the central lowlands. It has been gashed into mountainous hills by streams. The north-central portion is known as the Alleghenies; the southern, as the Cumberlands. Between the main ranges and the dissected plateau stretch the broad Great Valley and the parallel ridges of the ridge-and-valley region (*see* Appalachian Highlands).

Farming the Uplands and the Coastal Plain

In New England and much of New York State, the farmers use the hilly land for hay and dairy pasture to meet the demand of city markets for milk. Truck farmers on the long, sandy Atlantic Coastal Plain ship vegetables to the cities throughout the year.

The best farmlands of the region lie in the Great Valley and on the rolling Piedmont. In the central section, farmers raise grain and vegetables, in addition to dairying. Tobacco is the chief crop of the Piedmont in Virginia and the Carolinas. Favorable slopes support fruit orchards.

Farther south, around the southeastern and southern edges of the mountains, lies the cotton belt. Here rainfall is abundant, and 200 days or more are frost free—exactly the conditions needed by the cotton plant. South of the cotton belt the climate becomes semitropical.

The Earth's Leading Manufacturing Area

The earth's richest manufacturing area stretches from the Potomac River northward through southern Canada and from the Atlantic Ocean inland into the Mississippi Valley. Its mills turn out virtually every manufactured product used by mankind. The thick coal beds of the Alleghenies and numerous waterfalls in the hills supply power and fuel for thousands of factories. Superb land and water transportation bring them raw materials and carry their goods to market throughout the world. Most of the people live in cities and towns and make their living from industry, commerce, and transportation.

Southeastern United States remains a region of farms and plantations, but industries have increased enormously in recent decades. They depend upon raw materials produced there. Textile mills spin and weave the cotton; cigarette factories use the tobacco; lumber mills and furniture factories process the timber. Cheap hydroelectricity from the mountain streams has attracted chemical, rayon, plastics, and other modern plants. The South's minerals include the coal, iron ore, and limestone used by Alabama's steel mills, phosphates, petroleum and natural gas, sulphur, and salt.

Semitropical and Tropical Coastal Plains

Along the Gulf of Mexico, lies the Gulf Coastal Plain. Here the climate changes to a year-round growing season, with abundant rainfall. The lowland follows the curve of the Gulf across Texas and southward across Mexico and Central America into the full tropics. From Florida to eastern Texas, ample rainfall supports forests, citrus fruit orchards, winter truck crops, sugar cane, and rice. The coasts of southern Texas and northern Mexico resemble the Great Plains in dryness. Irrigated areas near the Rio Grande bear winter crops. This part of Mexico is rich in petroleum.

The Yucatan peninsula receives moderate rainfall and is arid in places. It is the world's leading source of henequen, used for cordage. The remaining coast of southern Mexico and that of Central America get trade-wind rainfall and are covered with a dense, tropical rain forest. Few people live on this humid, fever-ridden lowland, except where banana plantations have been established.

On the lowlands of the West Indies islands, the plantations grow sugar cane, bananas, cacao, coconuts, and other tropical products. The farmers raise tobacco and coffee on the higher ground. The leeward sides of the islands' mountains may be too dry for farming without irrigation.

The Central Lowlands

THE CENTRAL lowlands occupy about three fifths of the continent. They are famed alike for agricultural and industrial production. The areas adjoining the Great Lakes are noted dairy regions and contain fruit orchards, vineyards, and truck farms. A rich corn belt extends from Indiana into Kansas, Nebraska, and South Dakota. Here farmers feed most of the corn to cattle and hogs and sell the stock.

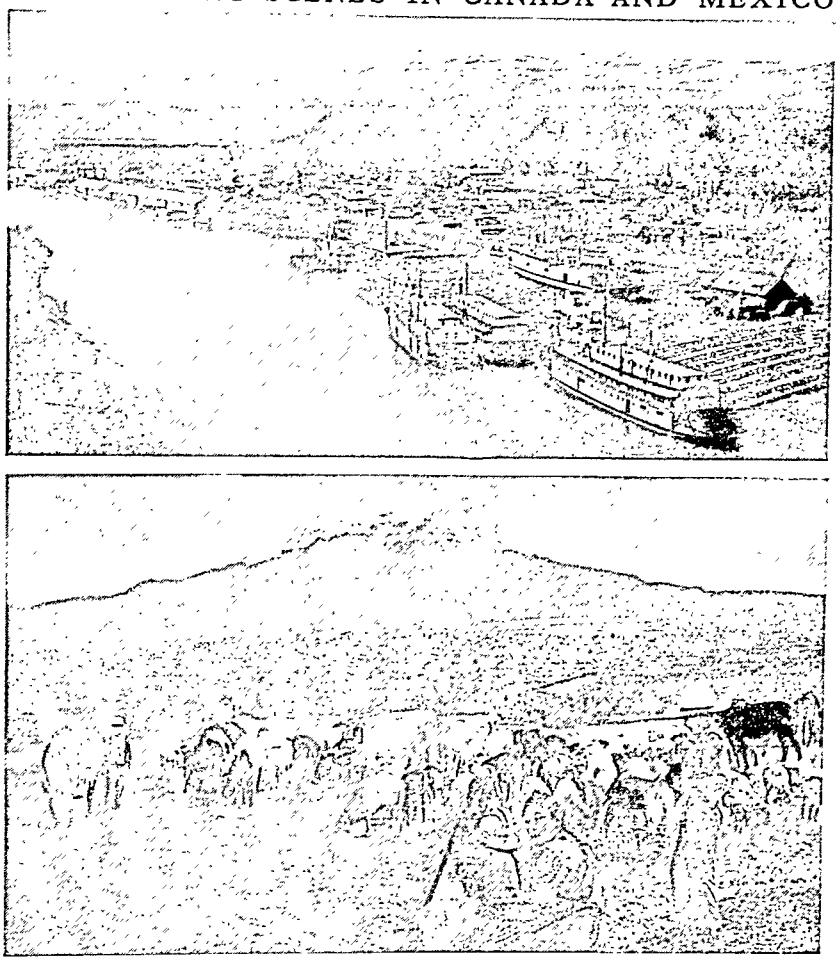
West and south of the corn belt lies the winter wheat belt. A spring wheat belt ranges north and west across the Dakotas, and Manitoba, Saskatchewan, and Alberta in Canada. Where the high semiarid Great Plains are too dry for wheat, stock grazing takes the place of farming. In the far north evergreen forest and tundra sweep across the plains as they do across the Shield.

Manufacturing and Mining

The great American manufacturing belt extends well into the central lowlands. Steelmaking and steel-using plants are leaders among the varied industries. Manufacturing cities and towns spread along the lower lakes region, the Ontario peninsula of Canada, and across the corn belt.

Minerals of the central lowlands include the iron and copper of northern Minnesota, Wisconsin, and Michigan and petroleum and gas beneath the Great Plains, especially in Oklahoma and Texas. Other deposits include salt and oil in southern Michigan; limestone in Michigan and Indiana; coal in Indiana and Illinois; lead and zinc in the Ozark-Ouachita uplands; and gold in the Black Hills.

CONTRASTING SCENES IN CANADA AND MEXICO



In the top picture we see tiny White Horse at the head of Yukon River navigation. Spring has unlocked the frozen river, and the stern-wheel steamers are ready to carry supplies to the scattered mining towns in this bleak, little-developed region. At the bottom a Mexican family herds their cattle, sheep, and goats in a warm, dry highland valley. Mount Ixtaccíhuatl's snowy cone looms in the distance.

Cordilleran Mountains and Plateaus

THE MOUNTAINS of the Cordillera tower boldly at the edge of the Great Plains in Canada and the United States, and rise from the Gulf Plain in Mexico. The continent's highest peak rises in Alaska. It is Mount McKinley (20,269 feet). Mount Logan, across the border in Canada, is second highest (19,850 feet); while the third in altitude, Mount Orizaba (18,700 feet), lifts its snowy cone among the volcanoes of Mexico's Sierra Madre del Sur.

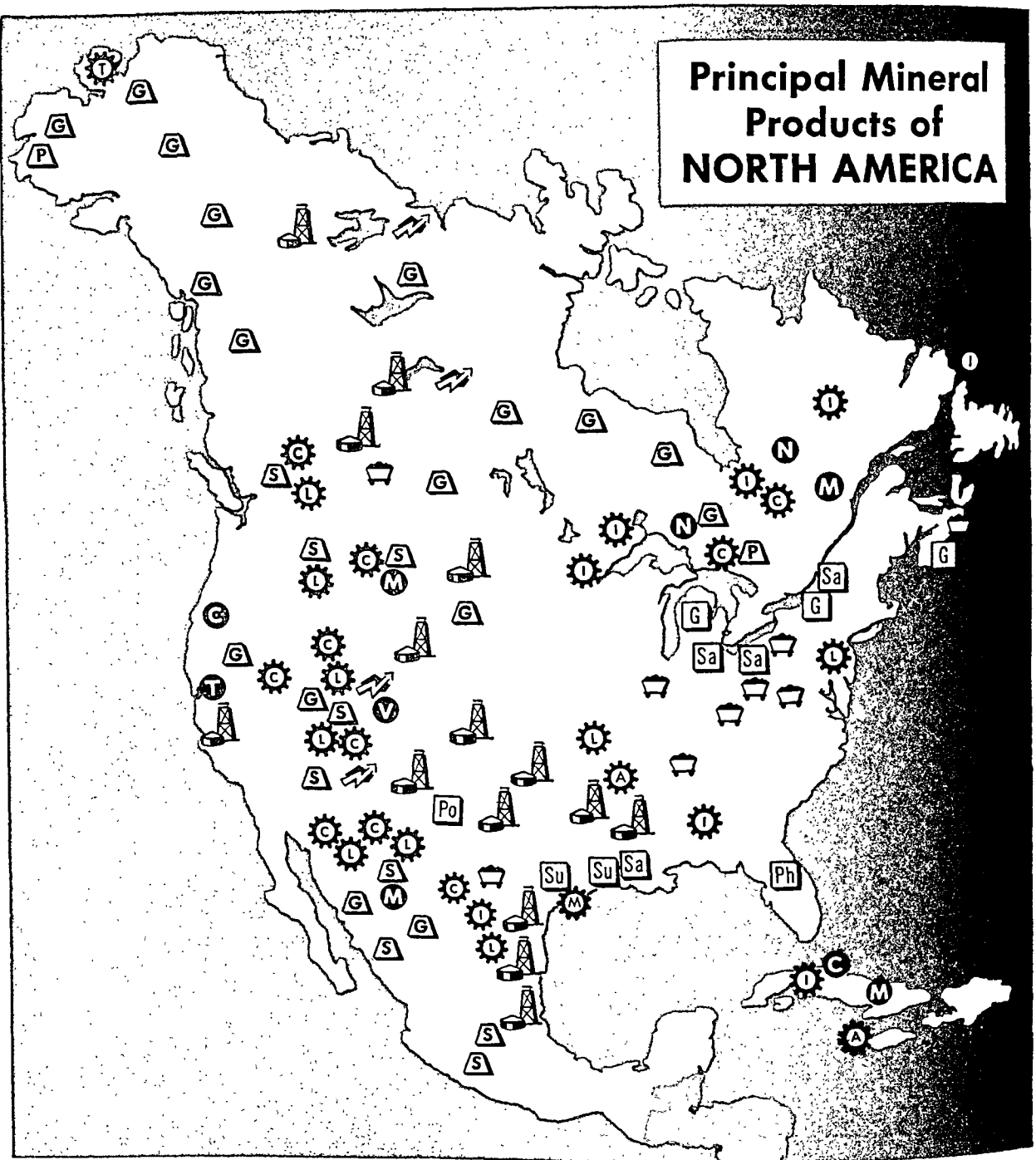
The westward-facing slopes of the western ranges are drenched by rain and snow and clothed in forests of giant evergreens. Lumbering is a giant industry in northern California, Oregon, Washington, and British Columbia. Fisheries are important all along this coast. Alaska is the richest source of salmon.

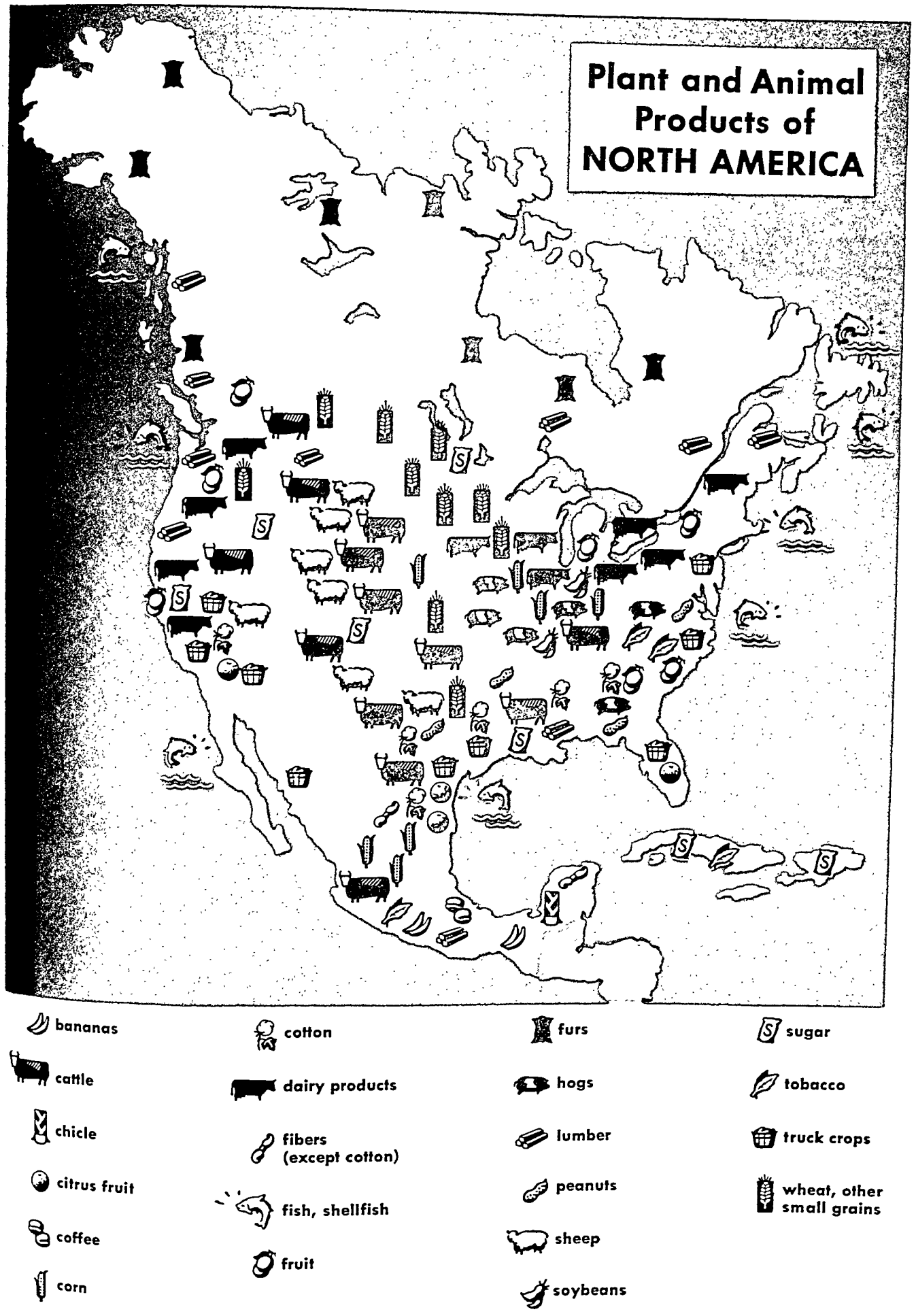
East of the moist western ranges, the Cordilleran region gets little rain. Broad areas in the plateaus and basins are barren desert. The higher ridges catch some moisture, and the runoff from them and from the snowy peaks fills large river systems. Engineers have dammed the rivers to produce power and water for irrigation (*see* Irrigation). Ranchers graze cattle and sheep on land too dry and rough to farm.

The largest and richest irrigation farming and orchard areas are in California's valleys and scanty Coastal Plain. The section is noted for truck crops and citrus and other fruits. California's agriculture and industry afford employment for the largest population in the Cordilleran states.

The uplands of southern Mexico and the Central American countries are more thickly populated than the lowlands. Fertile volcanic soil, a long growing season, and moderate rainfall permit the farmers to raise corn, beans, and vegetables for food and coffee for export. The people graze cattle, sheep, and goats on the rough, dry uplands. Mexico City is the largest metropolis of the Cordilleran highlands.

Minerals are the most valuable resources of the Cordilleras. Gold, silver, copper, lead, zinc, and other ores are mined from Alaska to Central America, and huge isolated deposits remain to be developed.


Principal Mineral Products of NORTH AMERICA
coal
oil and gas
radioactive metals
Precious Metals
gold
silver
platinum
Basic Industrial Metals
iron
copper
aluminum (bauxite)
lead and zinc
tin
magnesium
Common Alloying Metals
manganese
chromium
nickel
tungsten (wolfram)
vanadium
Nonmetallic Minerals
sulfur
salts
potash
phosphate
gypsum


Plant and Animal Products of NORTH AMERICA
bananas
cattle
chicle
citrus fruit
coffee
corn
cotton
dairy products
fibers (except cotton)
fish, shellfish
fruit
furs
hogs
lumber
peanuts
sheep
soybeans
sugar
tobacco
truck crops
wheat, other small grains

Plant and Animal Life of North America

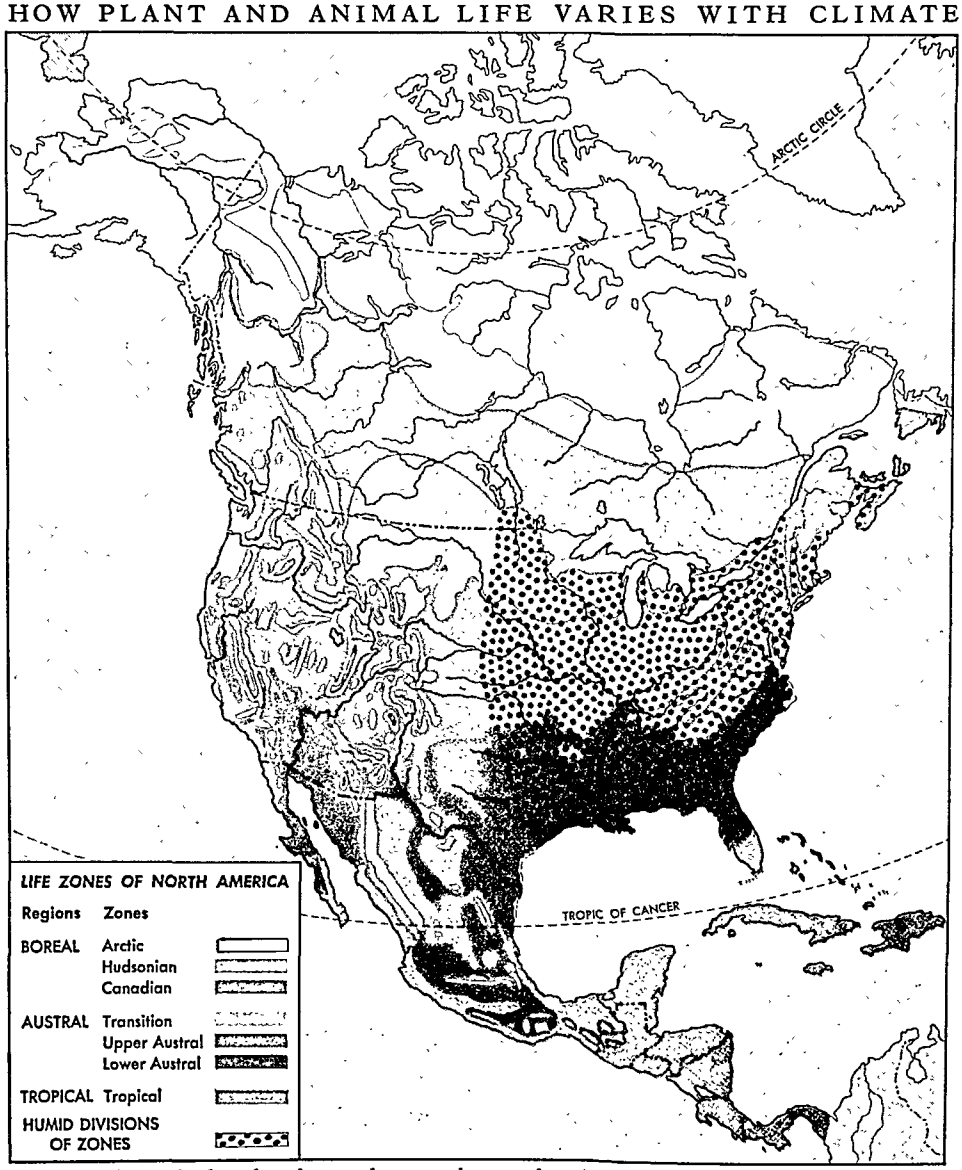
THE VAST North American continent holds a wide range of plants and animals. Naturalists divide it into life regions and zones in which various communities of plants and animals find suitable temperature, rainfall, soil, land surface, and other conditions (*see* Ecology). The three regions are the Boreal (northern), the Austral (southern), and the Tropical.

The Arctic, or Arctic-Alpine, zone is the northernmost division of the Boreal region. It spreads across the continent from Greenland to Alaska. Its soil lies frozen most of the year, with only a shallow thaw in summer. Howling gales prevent the growth of trees, except for stunted willows in sheltered spots. Quick-flowering plants spring up in summer, and mosses, lichens, and sedges spread over the ground.

Barren-ground caribou and musk oxen feed on the lichens, pawing aside the snow in winter. Many animals remain white the year around to protect themselves amid the snowy landscape. Among them are the polar bear, arctic fox, arctic hare, snowy owl, and gyrfalcon. Others, such as the ptarmigan, weasel, and lemming change their coats to white in winter. The sea holds riches in fish, seals, walrus, and whales.

The Hudsonian (middle) and Canadian (southern) zones of the Boreal region contain the great evergreen, or coniferous, forest that stretches across the continent from Labrador to Alaska. Spruces and firs are the chief trees, with white pine, hemlock, jack pine, and balsam fir in the east. The myriad animals that roam this forest include the woodland caribou, moose, black bear, wolverine, Canada lynx, marten, fisher, mink, and numerous species of squirrels, rabbits, moles, voles, and shrews. Besides the birds that live here the year around, hundreds of other kinds breed here and later migrate.

HOW PLANT AND ANIMAL LIFE VARIES WITH CLIMATE



This map shows the broad regions and zones where various types of climate produce corresponding types of associated plants and animals. In the Boreal region live those adapted to cold weather. The zones of the Austral region have humid areas in the east, where the rainfall encourages forests and forest animals, and drier areas of grassland and desert in the west. These dry areas support animals which can exist with little water. The Tropical region stretches over the lowlands of the far south.

Life in the Austral Zones

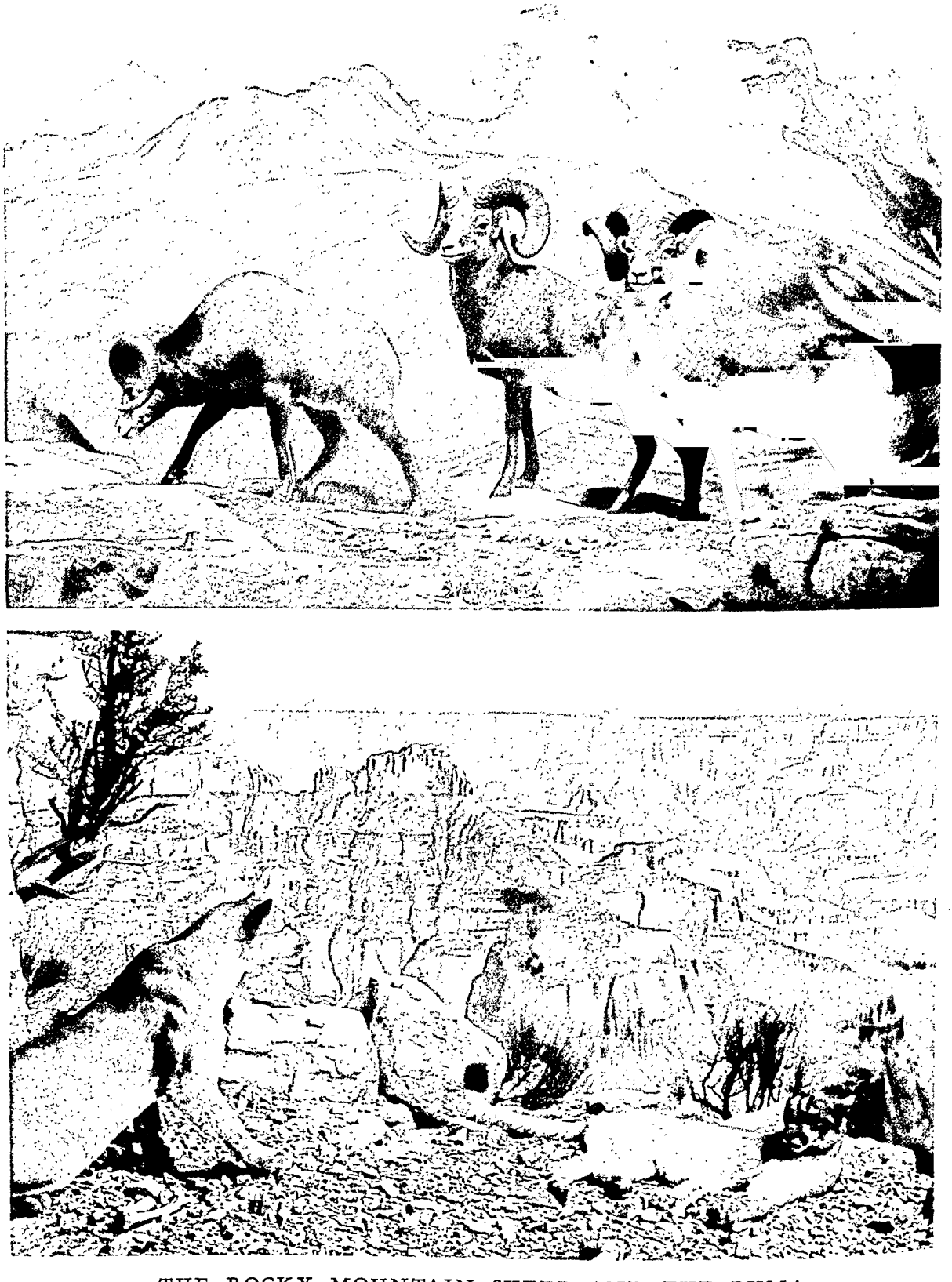
As the map shows, the Transition, Upper and Lower Austral zones of the Austral region are divided into humid eastern and arid western areas. In the west, the rainfall is less than 20 inches annually, and plants and animals differ from those of the east. The eastern parts of these zones are called respectively the Alleghenian, the Carolinian, and the Austroriparian area. The western parts are the Arid Transition, Upper Sonoran, and Lower Sonoran.

Continued on page 263



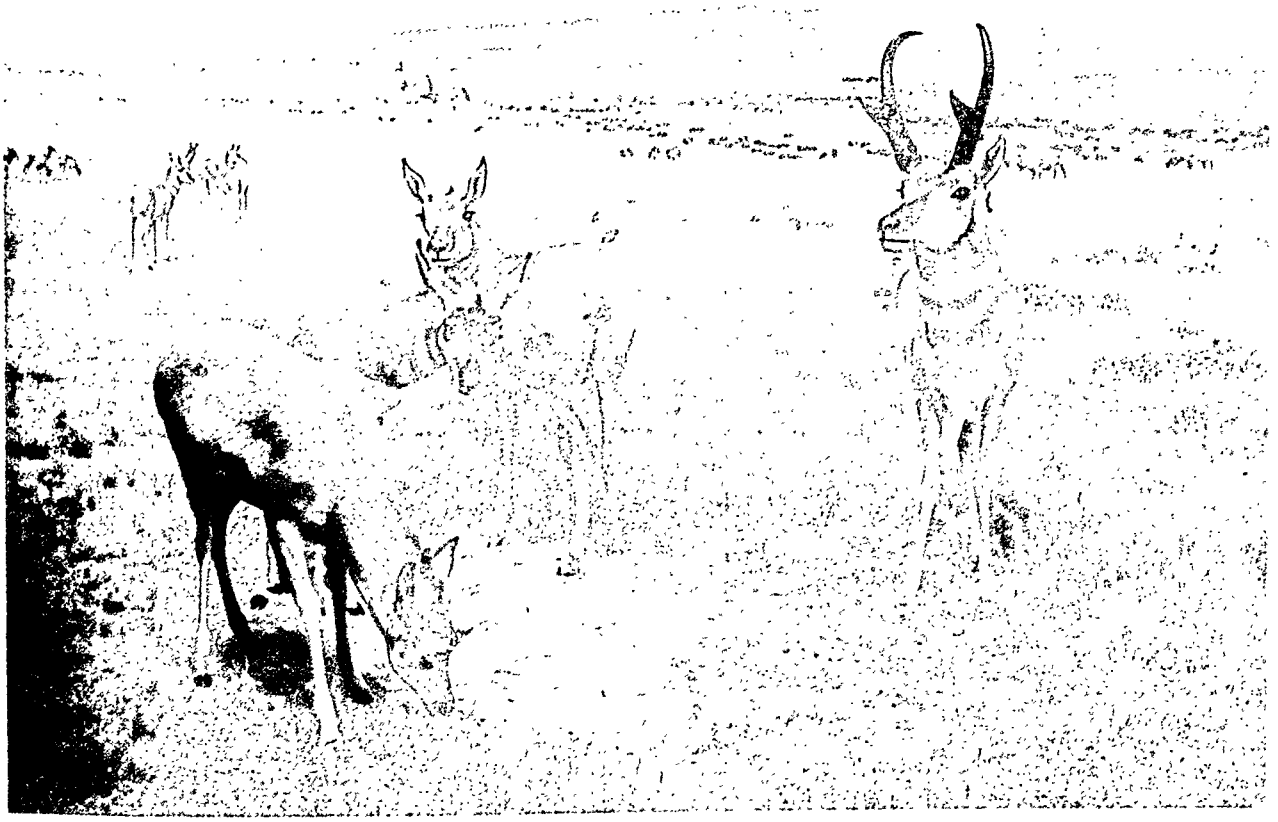
ANIMALS OF NORTH AMERICA—ROCKY MOUNTAIN GOATS

Above the timberline of the northern Rockies, these white-coated animals climb to places where the eagle is their only neighbor. On sturdy legs and sharp-rimmed, rubbery hoofs, they run up and down the steep rock walls with miraculous agility. The young are able to follow their parents when they are but a few days old. Rocky Mountain goats feed on lichens, moss, and the stunted vegetation that pushes up between the rocks. This and other photographs in this series are from life-size exhibits in the American Museum of Natural History, New York City.



THE ROCKY MOUNTAIN SHEEP AND THE PUMA

The bighorn, or Rocky Mountain sheep (top), range the high altitudes of western mountains from Colorado to British Columbia. The pumas, or mountain lions (bottom), are shown against the Grand Canyon, but they once roamed as far north and east as Maine.





THE PRONGHORN ANTELOPE AND THE BISON

Both the pronghorn (above) and the bison or American buffalo are natives of the great treeless plains of the West. The horns of the pronghorn buck explain how it got its name. The bison display the thick coats for the sake of which these animals were almost exterminated. Notice the cowbird catching insects on the back of the male.





THE GRIZZLY BEAR AND THE MOOSE

The top picture shows a family of grizzlies at the rim of a mountain canyon. The mother is turning over a rock to uncover grubs for one cub. The other cub, in a playful mood, has climbed a dead stump. Older grizzlies rarely climb trees. Below, two gigantic bull moose battle mightily during the mating season. The nearest bull has his opponent in an unfavorable position. Usually the weaker bull runs away after he has been knocked down and trampled.

The abundant rainfall in the east encourages tree growth. This section was covered with a dense forest of hardwood, or deciduous, trees when white settlers reached the continent. In the Alleghenian area the hardwoods mingled with evergreens in the north and on the mountain slopes. The principal hardwoods were the beech, birch, and maple.

To the south in the Carolinian area, oaks, chestnuts, walnuts, and hickories were most prevalent. Other species were sassafras, tulip trees, hackberry, sycamore, sweet gum, rose magnolia, redbud, and persimmon. In the warmer Austroriparian area, longleaf, loblolly, and slash pines, magnolia, and live oak covered the warm, rain-swept higher grounds. Cypress, tupelo, red gum, and cane grew in the swampy bottom land near the Gulf.

During 300 years of settlement, most of the northern evergreens and central hardwoods in the United States fell before the settler's ax and the woodsman's saw. Today the southern pine forests offer the chief lumber resource in the east.

Gone too are most of the wild animals. Typical of those in the hardwood forests were the Virginia deer, elk, black bear, bobcat, gray fox, red fox, opossum, cottontail rabbit, gray squirrel, raccoon, and skunk.

Wild birds vanished by the million with the advance of settlement, but bird lists of eastern states often name 300 or more species today. Typical of the Alleghenian area are the bobolink, vireo, and the hermit and Wilson's thrushes. Mingled with them are the birds of the Carolinian area—the partridge, Baltimore oriole, bluebird, catbird, chewink, thrasher, and wood thrush. Other typical Carolinian birds include the cardinal, Carolina wren, tufted titmouse, gnatcatcher, and yellow-breasted chat. The mocking bird, painted bunting, red-cockaded woodpecker, and chuck-will's-widow wing through the Austroriparian area. Wild water fowl live in the eastern swamps, and cormorants, herons, egrets, rails, gallinules, and other wading birds feed in the marshes.

The Tropical zone contains vast stretches of rain forest. Most of its myriad species of trees bear leaves throughout the year. Mahogany, dyewoods, logwood, wild coconut, and other palms, rubber trees, and chicle trees have commercial value. In the tangled jungle, monkeys swing from trees where parrots and other bright birds call. Tapirs, armadillos, jaguars, ocelots, and wild pigs hide in the underbrush. Sloths and anteaters live on the abundant insects. Alligators and other reptiles slither along the streams.

Wild Life in the Arid West

Rainfall grows lighter toward the west, even in the humid areas. The heavy forests disappear; but trees grow along the water courses and scattered stands of oaks are found amid the tall grass of the prairie.

West of the 100th meridian in the Arid Transition area, short grass and bunch grass flourish on the Great Plains. In pioneer times huge herds of bison cropped the grass. The pronghorn antelope and the jack rabbit sought safety in speed in a land that lacked forest cover. The coyote, the wolf, and the kit fox preyed on other wild things and the settlers' stock. Vultures watched for remnants of the kill, and golden and bald eagles soared in the blue. Prairie chickens, ruffed grouse, quail, turtledoves, pigeons, and wild ducks and geese were plentiful.

Vertical Life Zones in the Cordilleras

In the Cordilleras a large share of the rugged mountains and arid plateaus and basins remain wilderness. The natural vegetation and wild life are undisturbed and may be seen today. It is not necessary to travel from the hot deserts of Mexico to the icy peaks of Alaska to see the region's plants and animals. In a climb up a single high mountain, one may pass through most of the continent's life zones.

In the Grand Canyon, gashed deep into the high Colorado plateau, the plants and animals of the dry, hot Lower Sonoran area live at the bottom. Next come those of the Upper Sonoran, then those of the Arid Transition area, and finally those of the Canadian zone at the top. Parts of Glacier National Park in Montana lie in the Transition, Canadian, Hudsonian, and Arctic-Alpine zones.

Desert plants are adapted to conserve the little moisture they can sap from the dry soil. They include various cacti, mesquite, sagebrush, creosote bush, and greasewood. Among the animals suited to the desert are horned toads, lizards, king and bull snakes, desert jack rabbits, long-eared desert foxes, and many small burrowing animals such as the chipmunk and pocket gopher. Characteristic birds are the mockingbird, road runner, cactus wren, and desert thrasher.

Stunted live oak, scrub oak, and sumac form a chaparral belt found above the desert shrub in places. Black-tailed deer, coyotes, prairie dogs, and black-tailed jack rabbits dash through its scant cover.

Well up the slopes where rain and snow supply abundant moisture, stand the forests of the Canadian zone. Lodgepole pine, Englemann spruce, aspen, black cottonwood, mountain maple, western hemlock, tamarack, Douglas fir, and blue spruce shade the rocky ground. Here dwell moose, elk, mule and white-tailed deer, Canada lynx, pumas, red foxes, gray wolves, grizzly and black bears, and many small scurrying creatures.

Tall timber disappears in the Hudsonian, or timberline, zone. Trees become dwarfed and wind beaten. Masses of bright flowers spread over the summer meadows. Rocky Mountain goats, bighorn sheep, marmots and Alpine chipmunks live in this zone and the even more barren Arctic-Alpine zone above. Ptarmigan, rosy finches, pipits, siskins, crossbills, white crowned sparrows, and great golden eagles nest here.

Glaciers and snow fields cover much of the Arctic-Alpine zone at the summits. But where the snow melts under the summer sun, Alpine flowers peep through the soil and burst into bloom.

Along the moist northwest Pacific coast, the mountains rise through humid zones. In the dense forests that clothe them, Douglas firs, redwoods, sequoias, western hemlock, Sitka spruce, Pacific cedar, and other cone-bearing trees tower to great heights.

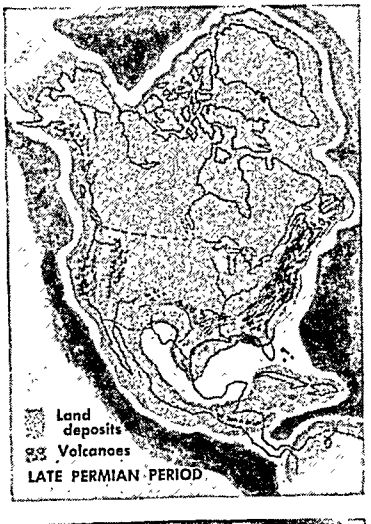
HOW NORTH AMERICA TOOK SHAPE THROUGH THE AGES

According to geologic dating, the best-known portion of North America's history began several hundred million years ago in the Cambrian period.

Since that time, the continent has undergone many changes. Land has sunk and has been forced upward; seas have spread over the land and ebbed away again. There have been great eruptions of lava, and glaciers have covered much of the land. Mountains have been built and then worn away.

This page gives the highlights of this story during the three long eras into which the well-known record of the North American continent is divided. Both maps and discussion tell how changes followed each other as the continent became more and more like it is today.







PALEOZOIC LANDS AND SEAS

This story of North America's changes begins with the first (Cambrian) period of the Paleozoic era. The continent probably was larger than it is now and was almost level. Only a few low mountains stood in the East and the West.

Parts of the continent's lowest (negative) region soon sank and became shallow seas. For ages those seas shifted to and fro. Sometimes they almost disappeared; sometimes they covered about two-thirds of the continent. The seas reached their greatest extent in the Ordovician period. At still other times, mountains developed. Rivers from some of those mountains built deltas in the narrow seas.

Various kinds of rocks were laid down as a result. Limestone, shale, and sandstone were common. During Pennsylvanian times of the Carboniferous period, which came near the end of this era, North America's greatest coal beds formed in swamps that spread from eastern Canada to central Texas.

THE MESOZOIC ERA (TIME OF REPTILES)

The Paleozoic era closed with the Permian period. Most of North America became land. Mountains formed in Oklahoma and Arkansas, and volcanoes erupted farther to the west. Narrow seas disappeared forever from the East, where rocks were crumpled into the early Appalachian Mountains. These may have been higher than the Rockies and Sierra Nevada are today.

Then came the Mesozoic era. Reptiles had grown common during Permian times and now became the dominant animals. Dinosaurs walked on dry land and waded in swamps. Other reptiles flew in the air and swam in lakes and seas. At first those seas were small, but in Cretaceous times they covered almost half the continent. Toward the end of that period they became smaller, however, and finally drained away. This was the last great marine invasion of North America.

MODERN (CENOZOIC) NORTH AMERICA

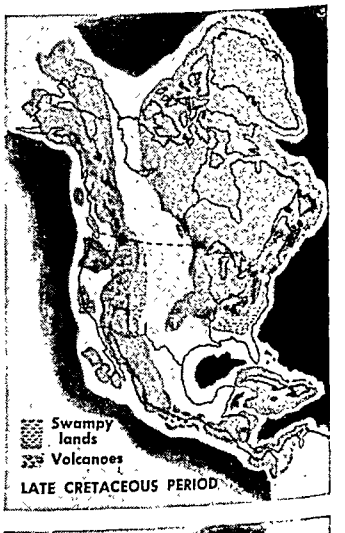
At the end of the Mesozoic era, most of North America became land. Mountains were formed from Central America to Alaska.

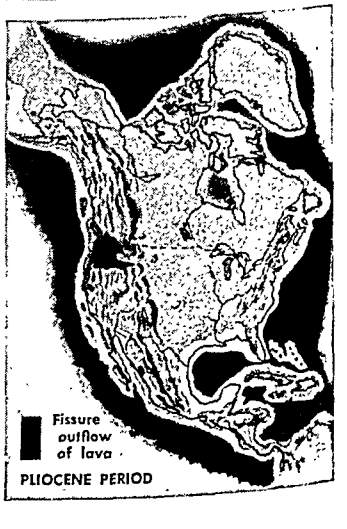
In the Eocene period of the Cenozoic era, the continent began to look as it does today. Then some of the mountains were worn down. Shallow seas covered lowlands, northward as far as Illinois. Large reptiles disappeared; their place was taken by mammals.

As time passed, seas became smaller and smaller. The Rocky and Appalachian mountains were pushed upward again, and lava which poured out of cracks in the ground built plateaus in the West. Other lava built the great volcanoes of the Cascade Mountains.

By Pliocene times, just before the Ice Age (or Pleistocene), North America was almost as we know it. Only a few more changes occurred in later times. (The maps are adapted from Dunbar, 'Historical Geology' [Wiley].)







Geologic Development

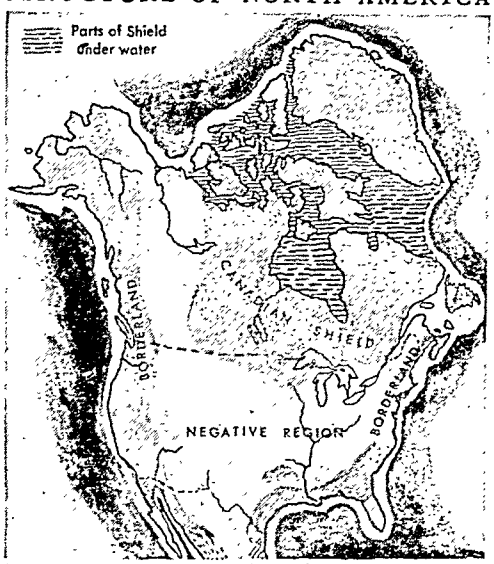
EVER since the beginning, four parts of the continent have maintained a reasonably continuous existence. Three are called *positive* areas, because parts or most of them have usually been land. The first is a northern core or shield, commonly called the Canadian Shield. It has been land throughout a large part of earth history. When seas did cover parts of it, as Hudson Bay does now, they were never very deep.

The east and west margins of the continent are somewhat less positive areas called *borderlands*. They once extended into what now are the Atlantic and Pacific oceans. Most parts of these borderlands are now mountainous, and they have been mountainous at several times in the past. At other times they may have been chains of islands separated by narrow seas. The name Appalachia has been applied to the eastern borderland and Cascadia to the western, with the understanding that each has been partly land and partly sea during past ages.

Between the borderlands and the shield lies a low, roughly U-shaped region. It is called *negative* because it has sunk many times. At some periods it was lowland or swampy. At others it sank so much that it allowed seas to spread over the continent.

During periods of submergence, rivers flowing from adjoining ancient land carried worn rock material (sediment) into the seas that covered the negative region. This material settled in layers or beds which in due time became sandstone, shale, limestone, and other kinds of sedimentary rock. The beds were thickest and heaviest in two narrow belts adjoining the borderlands, where most of the sediment was deposited. It filled the negative region almost as rapidly as the latter sank.

STRUCTURE OF NORTH AMERICA



Here are the borderlands, shield, and negative region that compose the continent. The text tells how they have changed through the ages.

At other times, the negative region was arched up into land, and parts of it were crumpled into mountains. As a rule, this occurred along the inner edges of the borderlands, as though they had moved inward, crushing and folding the adjoining sediments. Molten rock often forced its way into the cores of the crumpled mountains and hardened. At other times the molten stuff erupted, building volcanoes and lava plateaus.

During the long march of earth history, several great successions of submergence and uplift occurred. Outstanding examples of each phase are shown on the opposite page. The article on Geology gives a record of the successive eras, periods, and epochs, together with the most important deposits.

Today the continent is uplifted. The Canadian Shield is above sea level, except for Hudson Bay. The Appalachian and Cordilleran mountain systems have been formed along the borderlands, and the negative area lies between as a broad, level plain.

REFERENCE-OUTLINE FOR STUDY OF NORTH AMERICA

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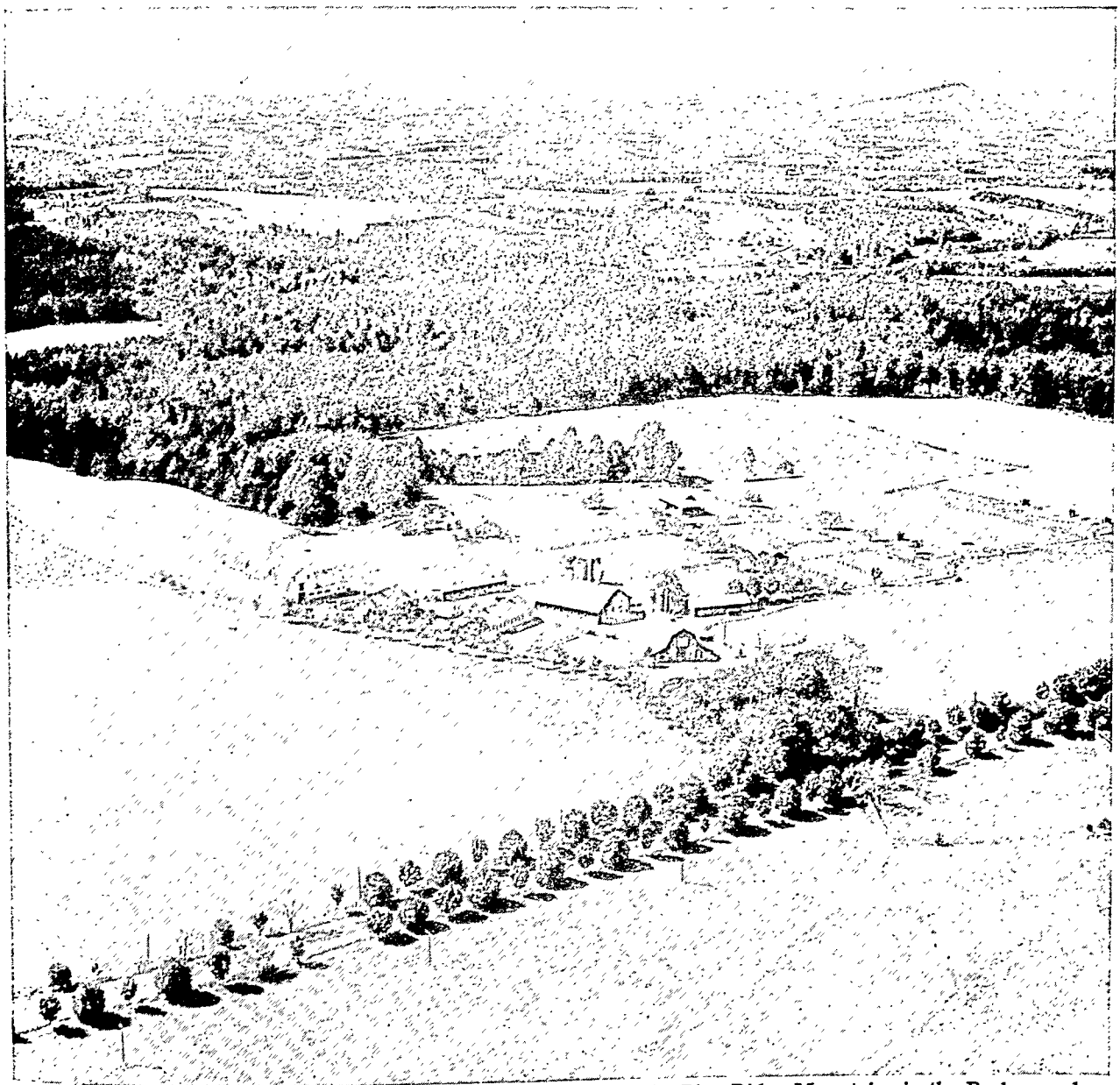
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(*See also* bibliographies for Canada, Mexico, and the United States.)

NORTH CAROLINA, *the* "TARHEEL STATE"



This Fairchild Air View Shows a Yadkin Valley Dairy Farm with the Blue Ridge Mountains in the Background.

NORTH CAROLINA. This was the spot in the New World first occupied by England, and here the first Anglo-American child, Virginia Dare, was born. Even today a large part of the state's white population is descended from English-speaking stock.

The state holds within its boundaries a bit of almost everything that the whole Atlantic coast possesses. Along the eastern coastal plain are low sandy lands. In contrast to these lowlands, North Carolina's mountains are the highest of the Appalachian chain. The state has small quantities of many kinds of minerals and almost every variety of tree and flower known to the temperate zone from Georgia to the southern part of Canada.

Nearly every kind of food and fiber plant grown as a major crop in the United States is raised in North Carolina. The only exceptions are subtropical plants such as citrus fruits. The land yielded a great variety of foods even 300 years ago. An old account of the region reports that the Indians gave to the explorers "divers kindes of fruites, melons, walnuts, cucumbers, gourdes, pease, and divers rootes, and fruites very excellent good, and of their countrey corne, which is very white, faire, and well tasted."

Contrasts in Climate, Soil, and Surface

The diversity of agricultural products within the state is due to variations in climate and soil. The climate ranges from subtropical in the southeast to temperate in the northwest. The soil varies from sandy to deep red clay.

In extent from east to west North Carolina is the longest state east of the Mississippi. Its surface is an

THE THREE REGIONS OF NORTH CAROLINA



In the western region of the state are the Appalachian Highlands. Here is the highest point in the eastern United States, the 6,684-foot Mount Mitchell. From the mountains the land slopes down to the Piedmont Plateau. This region covers about one half of the state and is its most important farm, factory, and trade section. East of the Piedmont is the broad and level coastal plain. Along the 320-mile coast is a long string of narrow reefs, called banks, enclosing large lagoons.

incline, sloping from the Great Smoky Mountains, with peaks more than 6,000 feet high in the western part of the state, to the level of the Atlantic Ocean along North Carolina's eastern coast.

The state's great length is divided into three distinct regions. In the west is a high, cool mountain region. Here is typical resort country, unsurpassed in eastern America for its beauty. This is a land of pure, cold springs, of delicious fruits, and of lovely flowers. The worn-down mountains are covered with deep, rich soil and with great hardwood forests almost to their tops. Mount Mitchell is the highest peak of the Appalachians (6,684 feet). From its summit seven states can be seen.

This "land of the sky" descends suddenly several thousand feet to the Piedmont Plateau. Here the land changes from mountains and valleys to hills and dales and finally to gently rolling country. This plateau covers about one half of North Carolina and is its important industrial region. It produces a wide range of agricultural and manufactured goods. Among the latter are cotton yarns and textiles, in which North Carolina is a leading state.

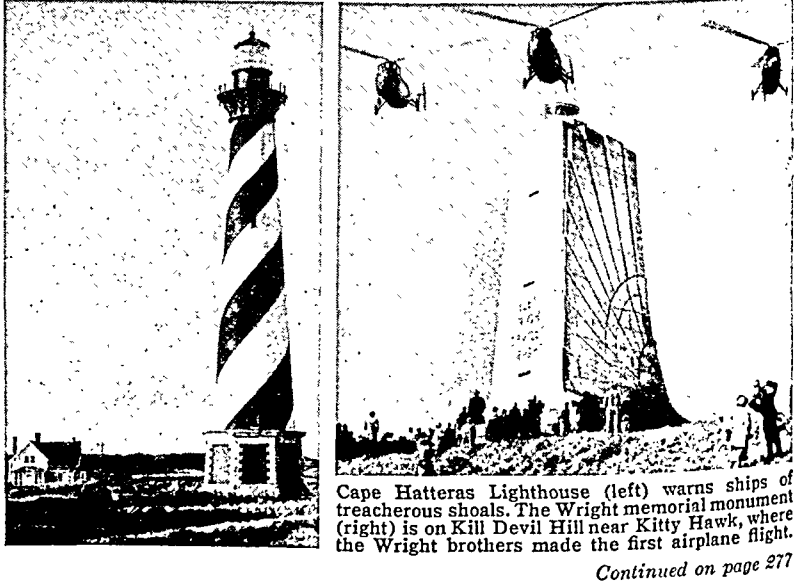
The eastern region consists of the coastal plain. It includes about two fifths of the state's area. This plain has recently become one of the great fruit- and truck-growing regions of the country. It ships fresh food to markets of the North.

North Carolina has two coast lines. The inner coast is deeply indented by Albermarle and Pamlico sounds. The outer coast is a chain of long narrow reefs, the Outer Banks. Their main projections are Cape Fear, Cape Lookout, and Cape Hatteras. Lighthouses on Cape Hatteras warn of shoals. The cape has dangerous storms, due in part to the meeting of warm winds from the Gulf Stream with cooler land breezes. Waters off the cape are called the "graveyard of the Atlantic." The Intracoastal Waterway permits safe passage of watercraft along the coast. The Outer Banks Highway is a scenic drive. On the banks is Cape Hatteras National Seashore Recreational Area. The valuable coast fisheries yield menhaden, oysters, shrimp, clams, and other fish.

Farming in the "Tarheel State"

Agriculture ranks next to manufacturing in the number of people employed. The chief crop is tobacco.

LIGHTHOUSE AND PYLON ALONG THE COAST



Cape Hatteras Lighthouse (left) warns ships of treacherous shoals. The Wright memorial monument (right) is on Kill Devil Hill near Kitty Hawk, where the Wright brothers made the first airplane flight.

Continued on page 277

North Carolina Fact Summary

NORTH CAROLINA (N.C.): Named in honor of Charles I (Latin, *Carolus*), king of England.

Nickname: "Tarheel State," because in Civil War North Carolinians had stuck to their posts in a fierce battle and threatened to tar the heels of retreating soldiers. Also called "Old North State," from its position as the northern and older part when Carolina was divided.

Seal: "Liberty" stands, holding in her left hand a pole with cap upon it; in her right hand, a scroll with the word "Constitution." "Plenty" sits, her right hand held toward "Liberty," the overflowing horn at her feet.

Motto: Esse Quam Videri (To Be Rather Than to Seem).

Flag: For description and illustration, *see* Flags.

Flower: Dogwood. Bird: Cardinal. Tree: None official. Song: "Old North State"—words by William Gaston, adapted to a German melody.

THE GOVERNMENT



Capital: Raleigh (since 1792).

Representation in Congress: Senate, 2; House of Representatives, 12. Electoral votes, 14.

General Assembly: Senators, 50; term, 2 years. Representatives, 120; term, 2 years. Convenes Wednesday after the first Monday in January in the odd-numbered years. No limit to length of session.

Constitution: Adopted 1868. Proposed amendment must be (a) passed by three-fifths vote of legislature and (b) ratified by majority vote at a popular election.

Governor: Term, 4 years. May not succeed himself.

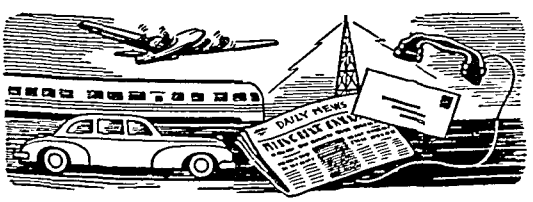
Other Executive Officers: Lieut. governor, secy. of state, attorney general, treasurer, auditor, commissioners of agriculture, labor, insurance, all elected; terms, 4 years.

Judiciary: Supreme court—7 justices, elected at large; term, 8 years. Superior courts—21 judges; judges elected; term, 8 years. County courts—established by General Assembly; judges elected; term, 2 to 4 years.

County: 100 counties, each governed by a board of commissioners of from 3 to 7 members. Boards and officers elected; term, 2 to 4 years.

Municipal: Mayor-and-council and council-and-manager types are most common.

Voting Qualifications: Age, 21; residence in state, 1 year; in district, 4 months. Literacy test required.



TRANSPORTATION AND COMMUNICATION

Transportation: Railroads, 4,400 miles. First railroad, Raleigh Experimental R.R. (2½ mi., from rock quarry to site of State Capitol), 1833. Rural roads, 65,300 miles. Airports, 136.

Communication: Periodicals, 82. Newspapers, 209. First newspaper, *North Carolina Gazette*, New Bern, 1751. Radio stations (AM and FM), 132; first station, WBT, Charlotte, licensed April 10, 1922. Television stations, 4; first station, WBTV, Charlotte, began operation July 15, 1949. Telephones, 713,600. Post offices, 1,093.

THE PEOPLE AND THEIR LAND

Population (1950 census): 4,061,929 (rank among 48 states—10th); urban, 33.7%; rural, 66.3%. Density: 82.7 persons per square mile (rank—15th state).

Extent: Area, 52,712 square miles, including 3,615 square miles of water surface (27th state in size).

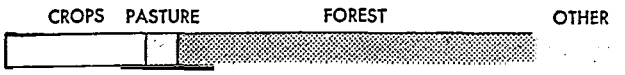
Elevation: Highest, Mount Mitchell, 6,684 feet near Busick; lowest, sea level.

Temperature (°F.): Average—annual, 59°; winter, 42°; spring, 58°; summer, 76°; fall, 60°. Lowest recorded, −21° (Mount Mitchell, Nov. 30, 1929, and other locations and earlier dates); highest recorded, 109° (Albemarle, July 28, 1940).

Precipitation: Average (inches)—annual, 49; winter, 11; spring, 12; summer, 16; fall, 10. Varies from about 40 in northwest to about 84 in southwest.

Natural Features: Huge shifting dunes, attractive beaches, narrow sand shallows (Coastal Plain); rolling farm land, thickly settled and highly cultivated region (Piedmont Plateau); largest and highest ranges of the Appalachian system (Mountain Region). Principal rivers: Broad, Cape Fear, Catawba, Neuse, Roanoke, Tar, Yadkin.

Land Use: Cropland, 22%; nonforested pasture, 6%; forest, 57%; other (roads, parks, game refuges, wasteland, cities, etc.), 15%.



Natural Resources: *Agricultural*—long growing season, adequate rainfall, varieties of soils suitable to growing many kinds of crops. *Industrial*—forests for wood-using industries; farm products for textile manufacture; stone, sand and gravel, tungsten, and clays. *Commercial*—fisheries, water power, scenic vacation land.

OCCUPATIONS AND PRODUCTS

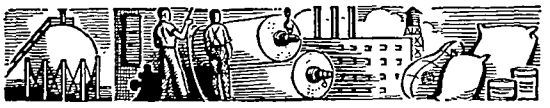
What the People Do to Earn a Living



Major Industries and Occupations, 1950

Fields of Employment	Number Employed	Percentage of Total Employed
Manufacturing	408,952	27.9
Agriculture, forestry, and fishery	363,998	24.9
Wholesale and retail trade	209,439	14.3
Personal services (hotel, domestic, laundering, etc.)	106,693	7.3
Professional services (medical, legal, educational, etc.)	97,847	6.7
Construction	86,388	5.9
Transportation, communication, and other public utilities	65,375	4.5
Government	38,469	2.6
Business and repair services	25,896	1.8
Finance, insurance, and real estate	24,414	1.7
Amusement, recreation, and related services	10,202	0.7
Mining	3,134	0.2
Workers not accounted for	22,545	1.5
Total employed	1,463,352	100.0

North Carolina Fact Summary



What the People Produce

A. Manufactured Goods (Rank among states—14th)
Value added by manufacture* (1952), $2,013,824,000

Leading Industries in 1947 (with Principal Products)	Value Added by Manufacture	Rank among States
TEXTILE MILL PRODUCTS.: ..... Cotton and rayon broad-woven fabrics; yarn and thread mills; knitting mills	$846,280,000	1
TOBACCO MANUFACTURES.....	257,986,000	1
FURNITURE AND FIXTURES.....	102,447,000	4
LUMBER AND PRODUCTS..... Sawmills and planing mills	84,127,000	8
FOOD AND KINDRED PRODUCTS..... Soft drinks; bakery products	78,430,000	27
CHEMICALS AND ALLIED PRODUCTS.	58,607,000	21
PAPER AND ALLIED PRODUCTS.....	47,395,000	18

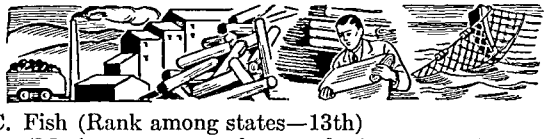
*For explanation of value added by manufacture, *see* Census.



B. Farm Products (Rank among states—12th)
Total cash income (1952), $948,959,000

Products	Amount Produced (10-Year Average)	Rank within State*	Rank among States†
Tobacco.....	701,601,000 lbs.	1	1
Corn.....	57,934,000 bu.	2	15
Cotton lint.....	579,000 bales	3	8
Milk.....	686,000,000 qts.	4	23
Hogs.....	288,589,000 lbs.	5	17
Hay.....	1,251,000 tons	6	29
Chickens.....	112,440,000 lbs.	7	13
Eggs.....	76,000,000 doz.	8	21
Peanuts.....	311,000,000 lbs.	9	2

*Rank in dollar value †Rank in units produced



C. Fish (Rank among states—13th)
(Marine waters and coastal rivers, 1950), catch, 172,339,000 lbs.; value, $6,800,000

D. Minerals (Fuels, Metals, and Stone)
Annual value (1951), $29,648,000
Rank among states—36th

Minerals (1951)	Amount Produced	Value
Stone.....	8,613,000 tons	$13,293,000
Sand and gravel.....	7,656,000 tons	4,436,000
Tungsten*.....	1,000 tons	.....

*Tungsten is 3d in value; exact figures not available.

E. Lumber (Rank among states—6th)
1,478,000,000 board feet (5-year average)

F. Trade

Trade (1948)	Sales	Rank among States
Wholesale.....	$3,145,768,000	16
Retail.....	2,248,660,000	16
Service.....	183,117,000	19

EDUCATION



Public Schools: Elementary, 2,483; secondary, 949. Compulsory school age, 7 through 15. State Board of Education consists of lieut. gov., state treas., state supt. of public instruction (elected, 4-year term), and 10 appointed members. General Assembly appoints county boards of education; 3 to 5 members; 2-, 4-, or 6-year terms. County boards appoint county supts. Most city school boards appointed by city councils or other city bodies; some elected. City boards of trustees appoint city supts.

Private and Parochial Schools: 88.

Colleges and Universities (accredited): Colleges—white, 22; Negro, 11; Indian, 1. Junior colleges, 25. State-supported schools include the Univ. of N. Carolina, Chapel Hill, with its Woman's College at Greensboro; State College of Agriculture and Engineering, Raleigh; 2 Negro colleges, Agricultural and Technical College, Greensboro; N. Carolina College, Durham; 1 Indian college, Pembroke State College, Pembroke; 6 teachers colleges: White—Appalachian State, Boone; East Carolina, Greenville; Western Carolina, Cullowhee; Negro—Elizabeth City, Fayetteville, Winston-Salem.

Special State Schools: Caswell Training School, Kinston; School for the Deaf, Morganton; School for the Blind, Raleigh; School for the Negro Blind and Deaf, Raleigh; Vocational Textile School, Belmont.

Libraries: City and town public libraries not affiliated with counties or regions, 17; 72 county libraries plus 19 counties in 7 regions make a total of 91 counties with county-wide service; 91 bookmobiles serve 91 counties. Library Comm. aids in developing public library service. Dept. of Public Instruction aids in developing school library service; work headed by School Library Adviser. Noted special library: Sondley Reference Library, Asheville.

Outstanding Museums: Asheville Art Gallery, Asheville; Mint Museum of Art, Charlotte; Hickory Museum of Art, Hickory; State Art Galleries, Raleigh.

CORRECTIONAL AND PENAL INSTITUTIONS

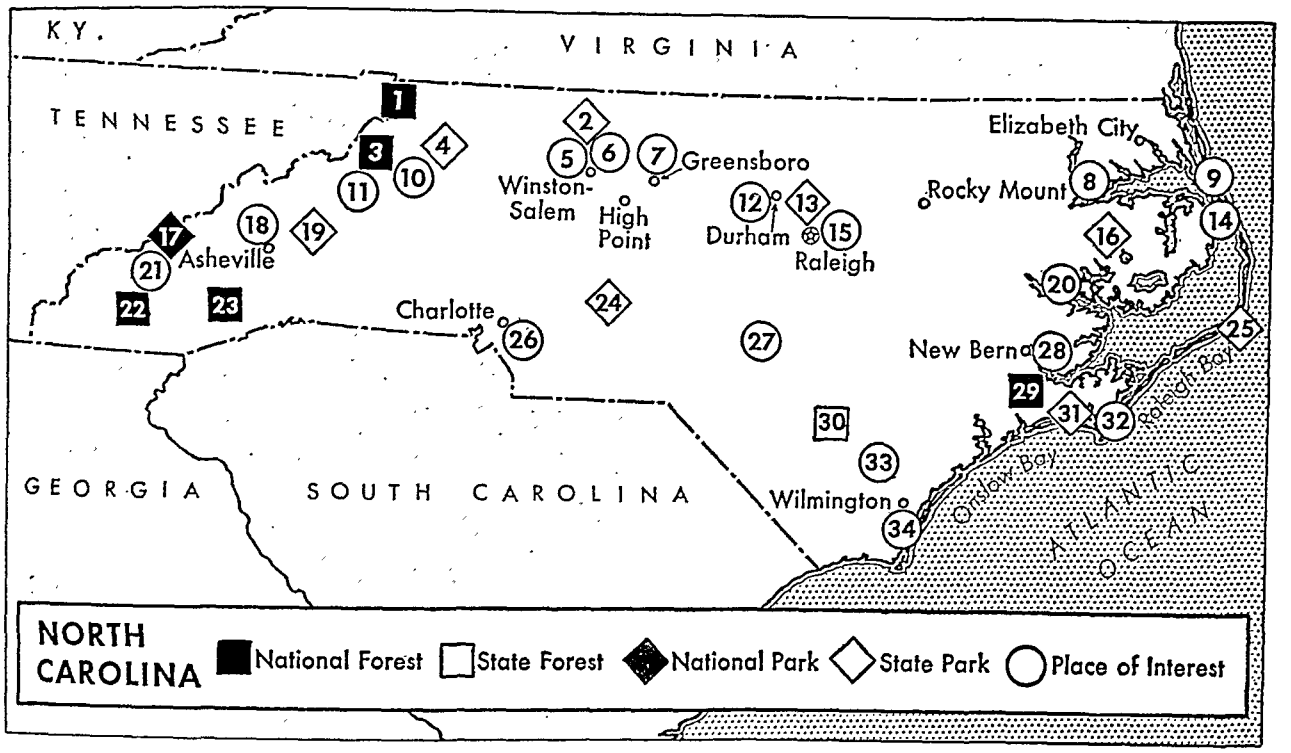
State Home and Industrial School for Girls (Samarcand), Eagle Springs; Eastern Carolina Industrial Training School for Boys, Rocky Mount; Stonewall Jackson Manual Training and Industrial School, Concord; State Training School for Negro Girls, Kinston; Morrison Training School for Negro Boys, Hoffman; Central Prison, Raleigh.

PLACES OF INTEREST*

Bennett Memorial—near Durham; site of Gen. J. E. Johnston's surrender to Gen. W. T. Sherman in 1865 (12).
Bethabara (Oldtown)—first Moravian settlement in state (1753); old church (1788) and few houses remain (5).
Biltmore House—George Vanderbilt's mansion (18).
Charlotte—Mint Museum of Art; Independence Square; Tulip Gardens (*see* Charlotte) (26).
Cherokee Indian Reservation—near Cherokee; largest reservation east of Wisconsin; about 130 sq. mi. (21).
Cupola House—old ship lookout in Edenton (8).
Fontana Dam—highest TVA dam; Fontana L.; w. of (21).
Fort Armory Remains—near James City; built 1862 (28).
Fort Bragg—Fayetteville; army training center (27).
Fort Defiance—home, near Legerwood, of Gen. William Lenoir, Revolutionary War leader (10).

*Numbers in parentheses are keyed to map.

North Carolina Fact Summary



Fort Raleigh National Historic Site—on Roanoke Island; first attempted English settlement in America (14).
Guilford Courthouse National Military Park—near Summerfield; scene of a Revolutionary War battle (7).
Hiawassee Dam—TVA dam forms lake; s.w. of (21).
Kill Devil Hill National Memorial—Kitty Hawk; site of Wright Brothers' first successful airplane flights (9).
Linville Caverns—limestone formations with underground streams and pools near Linville Falls (11).
Marine Laboratories—near Beaufort; terrapin (turtle) hatchery; marine museum and aquarium (32).
Moores Creek National Military Park—near Castle Hayne; site of Whig victory over Tories in 1776 (33).
Moravian Brothers' House—Winston-Salem; built 1769; now a Moravian Church Home for women (6).
Orton Plantation—near Wilmington; azalea and camellia garden; early colonial mansion built 1725 (34).
Raleigh—State Capitol; Hall of History, Education Building; modern state fair arena (*see* Raleigh) (15).
St. Thomas Episcopal Church—oldest church in state, built in 1734 at Bath, oldest town in N. Carolina (20).

LARGEST CITIES (1950 census)

Charlotte (134,042): industrial and commercial hub of the Piedmont region; many textile and hosiery mills.
Winston-Salem (87,811): "Twin City"; two cities combined by vote in 1913; tobacco, textiles, electronics.
Greensboro (74,389): industrial city; life insurance center.
Durham (71,311): large tobacco industries; cotton-textile and hosiery mills; site of Duke University.
Raleigh (65,679): state capital and educational center; trading center for farm area; textile-mill products.
Asheville (53,000): mountain resort; textiles, furniture.
Wilmington (45,043): port and resort on Cape Fear River.
High Point (39,973): furniture; hosiery; textiles.
Fayetteville (34,715): farm market; textiles; lumber.

STATE FOREST*

Bladen Lakes (Bladen County)—36,000 acres (30).

STATE PARKS*

Brunswick Town—old port nr. Wilmington at symbol (34).
Cliffs of the Neuse—near Goldsboro and symbol (28).
Crabtree Creek—wooded area near Raleigh (13).
Fort Macon—fort built 1828–35 nr. Atlantic Beach (31).
Hanging Rock—in rugged mountains near Danbury (2).
James Iredell House—colonial house of an early member of U. S. Supreme Court in Edenton near symbol (8).
Jones Lake—for Negroes; water sports on lake in forest near Elizabethtown and symbol (30).
Morrow Mountain—ancient mountains nr. Albemarle (24).
Mount Mitchell—includes highest peak of Appalachians, Mount Mitchell, 6,684 feet; near Asheville (19).
Pettigrew—old plantation near Creswell; lake (16).
Reedy Creek—for Negroes; forest near Raleigh (13).
Rendezvous Mountain—historic site where Revolutionary War soldiers organized near North Wilkesboro (4).
Singletary Lake—near Elizabethtown and symbol (30).
Town Creek Indian Mound—near Mount Gilead and (24).
Tryon Palace—home of a royal governor and first capitol of the state; in New Bern near symbol (28).

NATIONAL PARK AND OTHER AREAS*

Blue Ridge Parkway—scenic mountaintop drive connecting Great Smoky Mountains Natl. Pk. in N. C. and Shenandoah Natl. Pk. in Va.; 477 miles long (17).
Cape Hatteras National Seashore Recreational Area—30,000 acres; ocean wilderness on Outer Banks; shifting dunes; beaches; fishing; lighthouse; at (25).
Great Smoky Mountains Natl. Park—272,967 acres in N. C. (234,192 acres in Tenn.); highest range of Appalachians; virgin forests; varied plant life (17).

NATIONAL FORESTS*

Cherokee—327 acres in state; total 1,204,429 acres in N. C. and Tenn.; hdqrs., Cleveland, Tenn. (1).
Croatan—294,610 acres; hdqrs., Asheville (29).
Nantahala—1,349,000 acres; hdqrs., Franklin (22).
Pisgah—1,177,303 acres; hdqrs., Asheville (3, 23).

*Numbers in parentheses are keyed to map.

North Carolina Fact Summary

THE PEOPLE BUILD THEIR STATE



1584—Queen Elizabeth I of England grants Sir Walter Raleigh right to establish colony in America; Raleigh sends expedition to explore coast of America; it lands on Roanoke Island.

1585—Raleigh's second expedition plants first English colony in America on Roanoke Island; Ralph Lane appointed governor. Colonists return to England, 1586.

1587—Raleigh sends second colony to Roanoke Island; led by John White. Virginia Dare is first child born of English parents in America, August 18.

1591—White, returning from trip to England, finds that the Roanoke settlers have disappeared.

1663—King Charles II grants what is now North and South Carolina to group of 8 "lords proprietors."

1701—First church in North Carolina built at Edenton.

1705—First known school opened in Pasquotank County. Bath is first town incorporated in present N. C.

1711—Tuscarora War begins with massacre of settlers by Indians; Indians defeated and dispersed to north.

1715—Church of England becomes established church.

1729—"Lords proprietors," except one, sell their Carolina interests to George II; "Granville District" in north remains under proprietor until 1775.

1730—Carolina divided into two provinces; George Burrington named governor of North Carolina.

1749—James Davis installs printing press at New Bern.

1768—Settlers in Orange County form the "Regulation" to oppose British rule; Governor Tryon defeats them in battle on Alamance Creek, May 16, 1771.

1774—Provincial congress organized at New Bern.

1775—Citizens of Mecklenburg County on May 20 purported to have issued declaration of independence, first in colonies; proof exists of their "Mecklenburg Resolves," May 31; royal governor flees colony.

1776—Whigs defeat Tories at Moore's Creek Bridge; North Carolina is first colony to direct its delegates to vote for independence at Continental Congress; state constitution adopted, December 18; capital, New Bern; governor, Richard Caswell.

1780—Cornwallis occupies Charlotte; British defeated at Kings Mountain in South Carolina.

1781—Battle of Guilford Court House, March 15, forces Cornwallis to begin retreat to Wilmington.

1784—State of Franklin organized; collapses, 1788.

1785—By Treaty of Hopewell, Cherokees cede their eastern North Carolina land; they cede remainder, 1835.

1788—North Carolina rejects Federal Constitution.

1789—North Carolina is 12th state to ratify U. S. Constitution, November 21. Univ. of North Carolina chartered; opens at New Chapel (now Chapel Hill), Jan. 16, 1795; first state university to open.

1790—North Carolina cedes western lands to U. S.

1792—Permanent capital site surveyed; named Raleigh.

1799—Gold discovered in Cabarrus County.

1810—North Carolina militia and Georgians skirmish over boundary dispute; accept 35th parallel, 1819.

1813—First cotton mill in South opened near Lincolnton.

1839—First public-school law enacted by state; first public schools open, 1840.

1840—Wilmington and Raleigh, and Raleigh and Gaston railroads completed.

1845—James K. Polk, born 1795 in Mecklenburg County, becomes 11th president of U. S.

1856—North Carolina Railroad completed from Charlotte to Goldsboro.

1861—North Carolina secedes from Union, May 20.

1865—Andrew Johnson, born 1808 in Raleigh, becomes 17th president of U. S. Wilmington is one of last Confederate ports captured; Johnston surrenders to Sherman near Durham. Washington Duke begins packaging tobacco for sale near Durham; American Tobacco Company founded, 1890, under James B. Duke, born 1857 near Durham.

1868—North Carolina readmitted to Union, July 2.

1903—Orville and Wilbur Wright make 1st flights in self-propelled aircraft at Kitty Hawk, December 17.

1924—Duke University endowment fund established.

1930—Great Smoky Mountains National Park created.

1933—State assumes maintenance of public schools.

1944—Fontana Dam on Little Tennessee River built.

1950—Atomic Energy Commission authorizes building of nuclear reactor at N. C. State College in Raleigh.

1951—Negro students admitted to professional and graduate schools of University of N.C. for first time.

1952—John H. Kerr Dam on Roanoke R., flood-control-power project for North Carolina-Virginia area, completed.

1953—Federal aid given in drought. Legislation passed against burning crosses for intimidation, wearing masks, and secret meetings. Cape Hatteras Natl. Seashore Recreational Area officially designated.

INDEX TO THE MAP OF NORTH CAROLINA

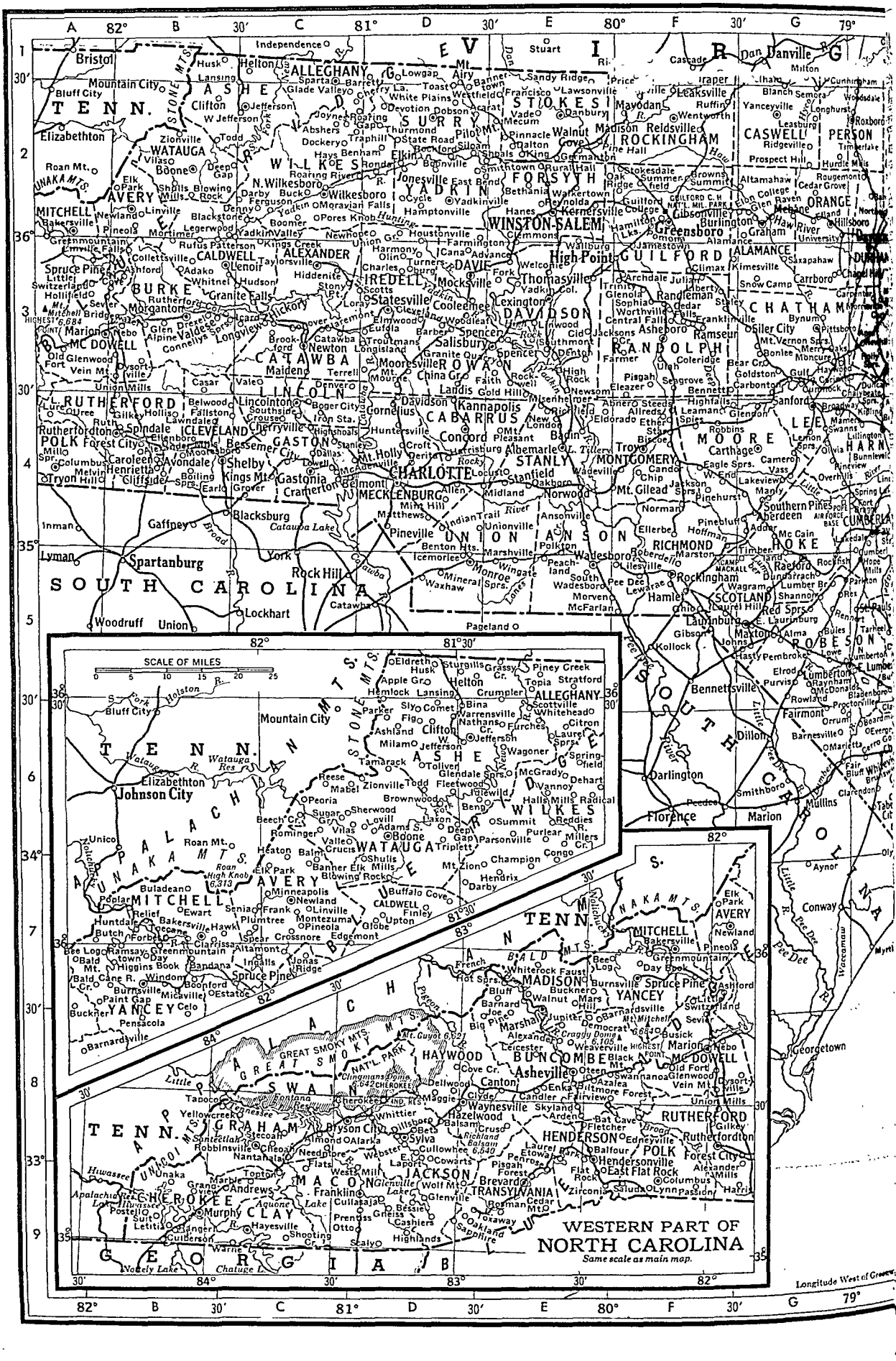
COUNTIES

Alamance	71,220	G 3
Alexander	14,554	C 3
Alleghany	8,155	C 1
Anson	26,781	E 4
Ashe	21,878	D 6
Avery	13,352	C 7
Beaufort	37,134	M 4
Bertie	26,439	L 2
Bladen	29,703	H 5
Brunswick	19,238	J 6
Buncombe	124,403	E 8
Burke	45,518	B 3
Cabarrus	63,783	D 4
Caldwell	43,352	B 3
Camden	5,223	N 2
Carteret	23,059	M 5
Caswell	20,870	G 2
Catawba	61,794	C 3
Chatham	25,392	G 3
Cherokee	18,294	B 9
Chowan	12,540	M 2
Clay	6,006	C 9
Cleveland	64,357	B 4
Columbus	50,621	H 6
Craven	48,823	L 4
Cumberland	96,006	H 4
Currituck	6,201	N 2
Dare	5,405	O 3
Davidson	62,244	E 3
Davie	15,420	D 3
Duplin	41,074	K 5
Durham	101,639	H 3
Edgecombe	51,634	K 3
Forsyth	146,135	E 2
Franklin	31,341	J 2
Gaston	110,836	C 4
Gates	9,555	M 2
Graham	6,886	C 8
Granville	31,793	H 2
Greene	18,024	K 3
Guilford	191,057	F 3
Halifax	58,377	K 2
Harnett	47,605	H 4
Haywood	37,631	D 8
Henderson	30,921	E 8
Hertford	21,453	L 2
Hoke	15,756	G 4
Hyde	6,479	N 3
Iredell	56,303	D 3
Jackson	19,261	D 9
Johnston	65,906	J 4
Jones	11,004	L 4
Lee	23,522	G 4
Lenoir	45,953	K 4
Lincoln	27,459	C 3
Macon	16,174	D 9
Madison	20,522	E 7
Martin	27,938	L 3
McDowell	25,720	A 3
Mecklenburg	197,052	D 4
Mitchell	15,143	B 7
Montgomery	17,260	F 4
Moore	33,129	G 4
Nash	59,919	K 2
New Hanover	63,272	K 6
Northampton	28,432	L 2
Onslow	42,047	L 5
Orange	34,435	G 2
Pamlico	9,993	M 4
Pasquotank	24,347	N 2
Pender	18,423	K 5
Perquimans	9,602	N 2
Person	24,361	H 2
Pitt	63,789	L 3
Polk	11,627	A 4
Randolph	50,804	F 3
Richmond	39,597	F 4
Robeson	87,769	G 5
Rockingham	64,816	F 2
Rowan	75,410	D 3
Rutherford	46,356	A 4
Sampson	49,780	J 4
Scotland	26,336	G 5
Stanly	37,130	E 4
Stokes	21,520	E 2
Surry	45,593	D 2
Swain	9,921	C 8
Transylvania	15,194	E 9
Tyrrell	5,048	N 3
Union	42,034	D 4
Vance	32,101	J 2
Wake	136,450	H 3
Warren	23,539	J 2
Washington	13,180	M 3
Watauga	18,342	D 6
Wayne	64,267	J 4
Wilkes	45,243	C 2
Wilson	54,506	K 3
Yadkin	22,133	D 2
Yancey	16,306	F 7

NORTH CAROLINA

CITIES AND TOWNS		
Abbottsburg		H 5
Aberdeen	1,603	G 4
Abner		F 4
Abshers	83	C 2
Acme	139	J 6
Adako	50	B 3
Adams	180	D 6
Addor	110	G 4
Advance	216	E 3
Ahoskie	3,579	L 2
Airlie	50	K 2
Alamance	415	F 2
Alarka	1,000	D 8
Albemarle	11,798	E 4
Alert	65	J 2
Alexander	1,200	E 8
Alexander Mills	885	B 4
Allen	100	D 4
Alliance	600	M 4
Allreds	53	F 4
Alma	116	G 5
Almond	250	C 8
Alston	50	J 2
Altamahaw	1,200	G 2
Altamont		C 7
Andrews	1,397	C 9
Angier	1,182	H 4
Ansonville	545	E 4
Apex	1,065	H 3
Apple Grove	50	D 5
Arapahoe	273	M 4
Ararat	37	D 2
Archdale	1,218	F 3
Arcola	122	J 2
Arden	400	E 8
Arlington	525	*D 2
Ash	125	J 6
Asheboro	7,701	F 3
Asheville	53,000	E 8
Ashford	291	B 3
Ashland	50	D 6
Ashton	200	K 6
Atkinson	294	J 5
Atlantic	844	N 5
Atlantic Beach	49	M 5
Auburn	100	H 3
Aulander	1,112	L 2
Aurora	525	M 4
Autryville	151	H 4
Aventon	150	K 2
Avon	400	P 4
Avondale	769	B 4
Ayden	2,282	L 4
Aydlett	200	O 2
Azalea	125	F 8
Bachelor	250	M 5
Badin	2,126	E 4
Bagley	27	J 3
Bahama	150	H 2
Bailey	743	J 3
Bakersville	428	B 7
Bald Creek	200	A 7
Bald Mtn.	50	A 7
Balfour	750	F 8
Balm	175	C 6
Balsam	600	D 8
Bandana	240	B 7
Banner Elk	462	C 7
Bannertown		D 1
Barber	175	D 3
Barco	425	O 2
Barnard	100	E 7
Barnardsville	500	B 8
Barnesville	100	G 6
Barrett	40	D 1
Bat Cave	120	F 8
Bath	381	M 4
Battleboro	329	K 2
Bayboro	453	M 4
Bear Creek	200	G 3
Beargrass	128	L 3
Beaufort	3,212	M 5
Bee Log	200	A 7
Beech Creek	55	C 6
Belcross	150	N 2
Belhaven	2,528	M 3
Bellarthur	190	K 3
Belmont	5,330	D 4
Belvidere	147	N 2
Belwood	300	B 4
Beng	50	D 6
Benham		C 2
Bennett	236	F 3
Benson	2,102	J 4
Bentonville	9	J 4
Berea	100	H 2
Bertie	259	M 2
Bessemer City	3,961	C 4
Bessie		D 9
Bests	55	K 4
Beta	150	D 8
Bethania	150	E 2
Bethel	1,402	L 3
Beulaville	724	K 5
Big Pine	275	E 8
Biltmore Forest	657	F 8
Bina	100	D 5
Biscoe	1,034	F 4
Black Creek	316	K 3
Black Mtn.	1,174	F 8
Blackstone	60	B 2
Bladenboro	796	H 5
Blanch	75	G 2
Blounts Creek	300	L 4
Blowing Rock	661	C 7
Bluff	100	E 7
Boardman	311	H 6
Bobbit		J 2
Boger City	1,733	C 4
Bogue	150	M 5
Boiling Sprs.	1,145	B 4
Bolivia	215	J 6
Bolton	606	J 6
Bonlee	275	G 3
Bonnerton	40	M 4
Boomer	150	C 2
Boone	2,973	D 6
Boonford	200	B 7
Boonville	502	D 2
Bostic	227	*B 4
Bowdens	239	J 4
Brevard	3,908	E 9
Bricks		K 2
Bridgeton	805	M 4
Bridgewater		B 3
Broadway	469	G 4
Brookford	768	C 3
Browns Summit	220	F 2
Brownwood	45	D 6
Brunswick	190	H 6
Bryson City	1,499	D 8
Buck	75	C 2
Buckner	100	E 7
Buffalo City	34	O 3
Buffalo Cove	352	D 7
Buies		G 5
Buies Creek	425	H 4
Buladean	50	B 7
Bullock	100	H 2
Bunn	255	J 3
Bunnlevel	177	H 4
Burgaw	1,613	J 5
Burlington	24,560	F 2
Burnsville	1,341	B 7
Busick	150	F 8
Butch	100	B 7
Butters	100	H 5
Buxton	550	P 4
Bynum	450	G 3
Calypso	688	J 4
Camden	200	N 2
Cameron	284	G 4
Cana	75	D 3
Candler	800	E 8
Candor	617	F 4
Cane River	250	B 7
Canton	4,906	E 8
Carbonton	90	G 3
Caroleen	1,712	B 4
Carolina Beach	1,080	K 6
Carpenter	150	H 3
Carrboro	1,795	G 3
Carthage	1,194	F 4
Cary	1,446	H 3
Casar	300	B 3
Cash Corner	230	M 4
Cashiers	305	D 9
Castalia	421	K 2
Castle Hayne	1,000	K 6
Catawba	506	C 3
Catharine Lake	75	K 5
Cedar Falls	650	F 3
Cedar Grove	100	G 2
Cedar Island	215	N 5
Cedar Mountain	134	E 9
Celo	150	B 7
Central Falls	500	F 3
Cerro Gordo	265	H 6
Chadbourn	2,103	H 6
Chalybeate Sprs.	300	H 3
Champion	92	E 6
Chapanoke	50	N 2
Chapel Hill	9,177	H 3
Charles	75	D 3
Charlotte	134,042	D 4
Cheoah	200	C 8
Cherokee	500	D 8
Cherry	73	M 3
Cherry Lane	104	D 2
Cherryville	3,492	C 4
Chicod	278	L 3
China Grove	1,491	D 3
Chinquapin	800	K 5
Chip	40	F 4
Chocowinity	150	L 4
Cid	200	E 3
Citron	50	E 6
Claremont	669	C 3
Clarendon	200	H 6
Clark	160	L 4
Clarkton	589	H 6
Clarrissa	250	B 7
Clayton	2,229	J 3
Clemmons	500	E 2
Cleveland	580	D 3
Cliffside	1,388	B 4
Clifton		D 6
Climax	225	F 3
Clinton	4,414	J 5
Clyde	598	E 8
Coats	1,047	H 4
Cofield	325	M 2
Coinjock	350	N 2
Colerain	367	M 2
Coleridge	450	F 3
Colington		O 3
Collettsville	250	B 3
Columbia	1,161	N 3
Columbus	486	F 9
Comet	50	D 6
Comfort	300	K 5
Como	250	L 1
Concord	16,486	D 4
Conetoe	172	K 3
Congo	75	E 6
Connellys Sprs.	550	B 3
Conover	1,164	C 3
Conway	618	L 2
Cooleemee	1,925	D 3
Corapeake	50	M 1
Corinth	97	G 3
Cornelius	1,548	D 4
Corolla	75	O 2
Council	64	H 6
Cove City	465	L 4
Cove Creek	100	E 8
Cowarts	85	D 8
Cramerton	3,211	C 4
Creedmoor	852	H 2
Creswell	425	N 3
Crisp	50	K 3
Croft	75	D 4
Crossnore	240	C 7
Crouse	303	C 4
Crumpler	218	E 5
Cruso	75	E 8
Culberson	150	B 9
Cullasaja	150	D 9
Cullowhee	500	D 8
Cumberland	500	H 5
Cumnock	250	G 3
Cunningham	60	H 1
Currie	200	J 6
Currituck	150	O 2
Cycle	150	D 2
Dallas	2,454	C 4
Dalton	69	E 2
Danbury	200	E 2
Darby		E 7
Davidson	2,423	D 4
Davis	600	M 5
Day Book	100	B 7
Deep Gap	150	D 6
Deep Run	142	K 4
Dehart	25	E 6
Delco	257	J 6
Dellview	7	*C 4
Dellwood	225	D 8
Democrat		E 8
Denny	100	C 2
Denton	766	E 3
Denver	415	C 3
Derita	600	D 4
Devotion	40	D 2
Dillsboro	198	D 8
Dixon	75	K 5
Dobson	609	D 2
Dockery	600	C 2
Dover	638	L 4
Draper	3,629	F 1
Drexel	988	B 3
Drumhill	75	M 1
Dublin	243	H 5
Duck		O 2
Dudley	133	J 4
Dulah	75	H 6
Duncan	100	H 3
Dundarrach	134	G 5
Dunn	6,316	H 4
Durham	71,311	H 2
Dysortville	100	B 3
Eagle Sprs.	350	F 4
Earl	300	B 4
East Bend	475	D 2
East Flat Rock	1,100	F 9
East Lake	100	N 3
East Laport	240	D 8
East Laurinburg	745	G 5
East Lumberton	1,106	H 5
East Spencer	2,444	E 3
Edenton	4,468	M 2
Edgemont	85	D 7
Edneyville	500	F 8
Edward	155	M 4
Efland	500	G 2
Elams	10	K 1
Elberon	75	J 2
Eldorado		F 4
Eldreth	50	D 5
Eleazer	60	F 3
Elizabeth City	12,685	N 2
Elizabethtown	1,611	H 5
Elk Park	545	C 7
Elkin	2,842	D 2
Elkton		H 6
Ellenboro	537	B 4
Ellerbe	773	F 4
Elliott	25	J 5
Elm City	839	K 3
Elmwood	300	D 3
Elon College	1,109	G 2
Elrod	135	G 5
Emerson	85	H 6
Enfield	2,361	K 2
Engelhard	500	O 3
Enka	1,792	E 8
Ernul	150	L 4
Erwin	3,344	H 4
Essex	35	J 2
Estatoe	300	C 7
Ether	50	F 4
Etowah	400	E 8
Eufola	150	D 3
Eure	200	M 2
Eureka	192	K 3
Everetts	244	L 3
Evergreen	245	H 6
Ewart		B 7
Fair Bluff	1,056	H 6
Fairfield	250	N 3
Fairmont	2,319	G 6
Fairview	300	E 8
Faison	768	J 4
Faith	490	E 3
Falcon	245	H 4
Falkland	174	K 3
Fallston	500	B 4
Farmer	125	F 3
Farmington	300	D 3
Farmville	2,942	K 3
Faro	140	K 4
Faust	100	E 7
Fayetteville	34,715	H 4
Ferguson	50	C 2
Fig	75	D 6
Finley	100	D 7
Flat Rock	1,000	E 9
Flats	150	C 8
Fleetwood	50	D 6
Fletcher	500	E 8
Florence	500	M 4
Folkstone	100	K 5
Forbes	253	B 7
Forest City	4,971	B 4
Fork	300	E 3
Fort Bragg	16,000	H 4
Fountain	451	K 3
Four Oaks	942	H 4
Francisco		E 2
Frank	25	C 7
Franklin	1,975	C 9
Franklinton	1,414	J 2
Franklinville	778	F 3
Freeland	300	J 6
Fremont	1,395	J 3
Frisco	100	O 4
Fuquay Sprs.	1,992	H 3
Furches	150	E 6
Garland	539	J 5
Garner	1,180	H 3
Garysburg	344	K 2
Gaston	1,218	K 1
Gastonia	23,069	C 4
Gates	150	M 2
Gatesville	323	M 2
Germanton	118	E 2
Ghio	104	F 5
Gibson	609	F 5
Gibsonville	1,866	F 2
Gilkey		B 4
Glade Valley	75	C 2
Glen Alpine	695	B 3
Glen Raven	750	G 2
Glendale Springs	200	D 6
Glendon	110	G 4
Glenola	100	F 3
Glenville	200	D 9
Glenwood		A 3
Globe	200	D 7
Gloucester	130	N 5
Gneiss	250	D 9
Godwin	145	H 4
Gold Hill		E 3
Gold Point	132	L 3
Goldsboro	21,454	K 4
Goldston	372	G 3
Graham	5,026	G 2
Grainger	168	K 4
Grandview	75	B 9
Grandy	500	O 2
Granite Falls	2,286	C 3
Granite Quarry	591	D 3
Grantsboro	1,500	M 4
Grassy Creek	500	E 5
Greenmountain	600	B 7
Greensboro	74,389	F 2
Greenville	16,724	L 3
Grifton	510	L 4
Grimesland	414	L 3
Grover	535	C 4
Guilford College	500	F 2
Gulf	300	G 3
Gulrock	51	O 4
Gupton	75	J 2
Halifax	346	K 2
Halls Mills	300	E 6
Hallsboro	300	H 6
Hamilton	514	L 3
Hamilton Lakes	882	F 2
Hamlet	5,061	F 5
Hampstead		K 6
Hamptonville	150	D 2
Hanes	1,000	E 2
Harbinger	250	O 2
Harkers Island	1,244	M 5
Harmony	374	D 3
Harrells	147	J 5
Harrellsville	167	M 2
Harris	110	G 9
Harrisburg	300	D 4
Hassell	137	L 3
Hasty	125	G 5
Hatteras	700	O 4
Havelock	4,500	M 5
Haw River	1,175	G 2
Hawk		C 7
Hayesville	356	C 9
Hayne	40	H 5
Hays	400	C 2
Haywood	169	G 3
Hazelwood	1,769	D 8
Heathsville	150	K 2
Heaton	50	C 6
Helton	192	D 5
Hemlock	750	D 5
Henderson	10,996	J 2
Hendersonville	6,103	F 8
Hendrix	150	E 7
Henrietta	1,013	B 4
Hertford	2,096	N 2
Hester	110	H 2
Hickory	14,755	C 3
Hiddenite	600	C 3
Higgins		B 7
High Point	39,973	E 3
High Rock	75	E 3
Highfalls	310	F 4
Highlands	515	D 9
Highshoals	875	C 4
Hildebran	529	*B 3
Hillsboro	1,329	G 2
Hobbsville	75	M 2
Hobgood	603	L 2
Hobucken		N 4
Hoffman	398	F 4
Hollifield	200	A 3
Hollis	65	B 4
Hollister	200	K 2
Holly Ridge	1,082	L 6
Holly Springs	406	H 3
Hookerton	253	K 4
Hope Mills	1,077	H 5
Hot Springs	721	E 7
Houstonville	150	D 2
Hubert	40	L 5
Hudson	922	C 3
Huntdale		B 7
Huntersville	916	D 4
Hurdle Mills	200	G 2
Husk	78	D 5
Icard	1,100	C 3
Idlewild	175	E 6
Indian Trail	308	D 4
Inez	40	J 2
Ingalls	75	C 7
Ingold	350	J 5
Iron Station	232	C 4
Ivanhoe	200	J 5
Jackson	843	L 2
Jackson Springs	246	F 4
Jacksons Creek	100	F 3
Jacksonville	3,960	K 5
James City	750	M 4
Jamestown	748	F 3
Jamesville	529	M 3
Jarvisburg		O 2
Jefferson	359	E 6
Joe	200	E 7
Johns	300	F 5
Jonas Ridge		C 7
Jonesville	1,768	D 2
Joynes	240	C 2
Julian	300	F 3
Jupiter	136	E 8
Kannapolis	28,448	D 4
Kelford	405	L 2
Kelly	100	J 6
Kenansville	674	K 5
Kenly	1,129	J 3
Kernersville	2,396	E 2
Kerr	40	J 5
Kill Devil Hills	125	O 3
Kimesville	100	G 3
King	1,000	E 2
Kings Creek	300	C 3
Kings Mountain	7,206	C 4
Kinston	18,336	K 4
Kipling	101	H 4
Kittrell	189	H 2
Kitty Hawk	300	O 2
Knightdale	461	J 3
Knotts Island	400	O 2
Kure Beach	228	K 6
La Grange	1,852	K 4
Lagoon	233	J 5
Lake Landing		O 4
Lake Lure	174	A 4
Lake Toxaway	270	E 9
Lake Waccamaw	575	J 6
Lakedale	4,000	H 4

*No room on map


WESTERN PART OF
NORTH CAROLINA
Same scale as main map.
SCALE OF MILES
0 5 10 15 20 25
TENN.
S. CAROLINA
GEORGIA
VIRGINIA
ALLEGHANY
ASHE
WATAUGA
WILKES
YADKIN
SURRY
STOKES
ROCKINGHAM
CASWELL
PERSON
ORANGE
DURHAM
ALAMANCE
GUILFORD
RANDOLPH
CHATHAM
LEE
MOORE
HARNETT
CUMBERLAND
HOKE
ROBESON
SCOTLAND
RICHMOND
MONTGOMERY
STANLY
UNION
ANSON
MECKLENBURG
CABARRUS
IREDELL
DAVIE
FORSYTH
WINSTON-SALEM
High Point
DAVIDSON
ROWAN
SALISBURY
CATAWBA
LINCOLN
GASTONIA
GASTON
CLEVELAND
RUTHERFORD
POLK
MC DOWELL
BURKE
CALDWELL
WATAUGA
AVERY
MITCHELL
YANCEY
MADISON
BUNCOMBE
HAYWOOD
TRANSYLVANIA
HENDERSON
POLK
RUTHERFORD
MC DOWELL
JACKSON
SWAIN
GRAHAM
MACON
CHEROKEE
CLAY
Asheville
Charlotte
Greensboro
Winston-Salem
Durham
Raleigh
Fayetteville
Wilmington
Pinehurst
Rockingham
Laurinburg
Lumberton
Bennettsville
Darlington
Florence
Marion
Dillon
Conway
Georgetown
Myrtle
Pee Dee
Little Pee Dee
Lumber
Waccamaw
Little
Yadkin
Catawba
Broad
Saluda
Pacolet
Green
Watauga
Elizabethton
Johnson City
Bristol
Mountain City
Bluff City
Boone
Blowing Rock
Linville
Grandfather Mtn.
Roan Mt.
Roan High Knob 6,313
Mt. Mitchell 6,684
Mt. Guyot 6,621
Clingmans Dome 6,642
Whitetop Mt. 5,520
Mt. Pisgah 5,721
Craggy Dome 6,105
Mt. Mitchell 6,684
Balsam 6,540
Richland Balsam 6,410
Cowee 5,250
Wayah Bald 5,336
Standing Indian 5,499
Fodderstack 5,842
Tusquitee Bald 5,528
Hiwassee
Nantahala
Fontana
Santeetlah
Unicoi
Smoky Mts.
Great Smoky Mts. Natl. Park
Blue Ridge
Unaka Mts.
Stone Mts.
Iron Mts.
Black Mts.
Balsam Mts.
Pisgah
Nantahala
Cowee
Tusquitee
Apalachian Mts.
Appalachian Trail
Eastern Continental Divide
Longitude West of Greenwich



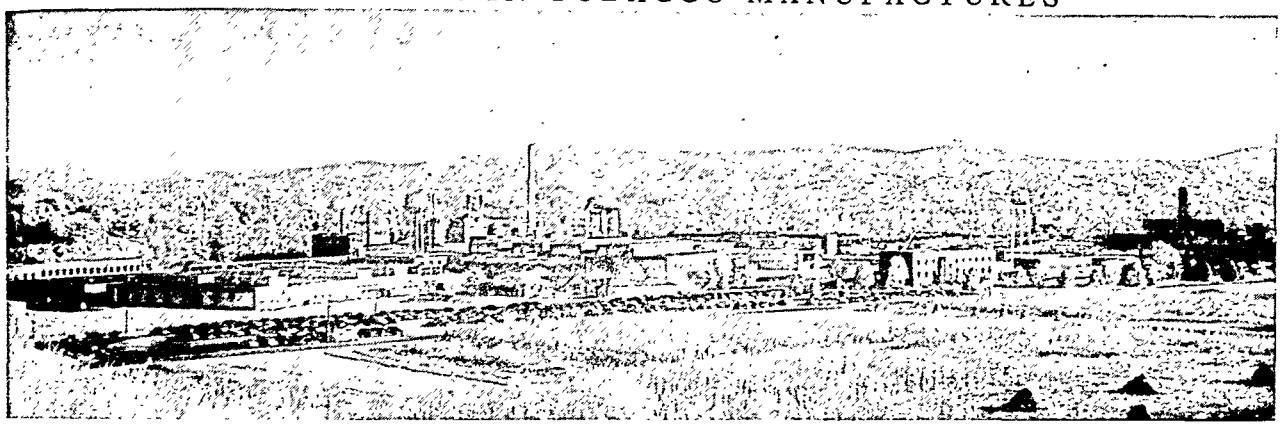
NORTH
CAROLINA
SCALE OF MILES
0 10 20 30 40 50
State Capitals
County Seats
Canals
Railroads
Copyright by C. S. Hammond & Co., N. Y.
3571
A T L A N T I C
O C E A N
ALBEMARLE SOUND
PAMLICO SOUND
RALEIGH BAY
ONSLOW BAY
CURRITUCK
CAMDEN
PASQUOTANK
PERQUIMANS
CHOWAN
GATES
HERTFORD
NORTHAMPTON
HALIFAX
WARREN
VANCE
FRANKLIN
NASH
EDGECOMBE
MARTIN
BERTIE
WASHINGTON
TYRRELL
DARE
HYDE
BEAUFORT
PITT
WILSON
GREENE
WAYNE
JOHNSTON
LENOIR
CRAVEN
PAMLICO
JONES
CARTERET
ONSLOW
DUPLIN
SAMPSON
PENDER
NEW HANOVER
BRUNSWICK
COLUMBUS
BLADEN
Elizabeth City
Edenton
Hertford
Plymouth
Williamston
Windsor
Washington
Greenville
Tarboro
Rocky Mt
Wilson
Nashville
Goldsboro
Kinston
New Bern
Jacksonville
Beaufort
Morehead City
Wilmington
Southport
Warrenton
Henderson
Louisburg
Smithfield
Clinton
Kenansville
Burgaw
Roanoke Rapids
Weldon
Halifax
Ahoskie
Manteo
Kitty Hawk
Nags Head
WRIGHT BROTHERS NAT'L MEM.
FORT RALEIGH NAT'L HISTORIC SITE
CAPE HATTERAS NAT'L SEASHORE RECREATIONAL AREA (Project)
Cape Hatteras
Hatteras Inlet
Ocracoke Inlet
Oregon Inlet
New Inlet
Cape Lookout
Cape Fear
Smith I.
Carolina Beach
Kure Beach
Wrightsville Beach
Wrightsville Sound
CHERRY PT. MARINE CORPS AIR STA.
CAMP LEJEUNE
MOORES CREEK NAT'L MIL. PARK
Lake Drummond
Dismal Swamp
Phelps Lake
Mattamuskeet Lake
Holly Shelter Swamp
Green Swamp

NORTH CAROLINA—*Continued*

Lakeview 300 G 4
Landis 1,827 D 3
Lansing 280 D 5
Lasker 177 L 2
Lassiter 35 J 3
Lattimore 286 *B 4
Laurel Hill 400 F 5
Laurel Park 302 E 8
Laurel Springs 250 E 6
Laurinburg 7,134 F 5
Lawndale 964 B 4
Lawsonville 200 E 2
Laxon 61 D 6
Leaksville 4,045 F 2
Leaman 21 F 4
Leasburg 400 G 2
Leechville 200 M 3
Legerwood 85 B 2
Leggett 200 K 3
Leicester 750 E 7
Leland 570 J 6
Lemon Springs 200 G 4
Lenoir 7,888 C 3
Letitia 35 B 9
Lewarae 479 F 5
Lewiston 339 L 2
Lexington 13,571 E 3
Liberty 1,342 F 3
Lilesville 605 F 5
Lillington 1,061 H 4
Lincolnton 5,423 C 4
Linden 194 H 4
Linville 500 C 7
Linville Falls A 3
Linwood 350 E 3
Little Switzerland 400 A 3
Littleton 1,173 K 2
Locust 216 E 4
Lola 150 N 5
Longhurst 1,539 G 2
Longisland 350 D 3
Longview 2,291 C 3
Longwood 800 J 6
Loray 115 C 3
Louisburg 2,545 J 2
Lovill D 6
Lowe 75 G 5
Lowell 2,313 C 4
Lowgap 500 D 1
Lowland 200 N 4
Lucama 405 J 3
Lumber Bridge 154 G 5
Lumberton 9,186 G 5
Lynn 600 F 9
Mabel 200 C 6
Macclesfield 370 K 3
Mackeys 250 M 3
Macon 238 J 2
Madison 1,789 F 2
Maggie D 8
Magnolia 585 K 5
Maiden 1,952 C 3
Mamers 200 G 4
Mamie 250 O 2
Manly 280 G 4
Manns Harbor 325 O 3
Manson 40 J 2
Manteo 635 O 3
Maple Hill 75 K 5
Mapleton L 2
Mapleville 50 J 2
Marble 375 C 9
Margarettsville 113 L 1
Marietta 94 G 6
Marion 2,740 A 3
Mars Hill 1,404 E 7
Marshall 983 E 8
Marshallberg 784 N 5
Marshville 1,258 E 4
Marston 159 F 5
Mashoes O 3
Matthews 589 D 4
Maury 251 K 4
Maxton 1,974 G 5
Mayodan 2,246 F 2
Maysville 818 L 5
McAdenville 1,060 D 4
McCain 900 G 4
McCullers 89 H 3
McDonalds 78 G 5
McFarlan 136 E 5
McGrady 175 E 6
Mebane 2,068 G 2
Melvin Hill 188 A 4
Merrimon 250 M 5
Merry Hill 200 M 2
Merry Oaks 160 G 3
Mesic 425 M 4
Method 350 H 3
Micaville 200 B 7
Micro 310 J 3
Middleburg 217 J 2
Middlesex 446 J 3
Middletown 200 O 4
Midland 250 E 4
Midway Park 3,703 L 5
Milam 50 D 6
Mill Spring A 4
Millbrook 100 H 3
Millers Creek 500 E 6
Milton 317 G 1
Milwaukee 302 L 2
Mineral Springs 135 D 5
Minneapolis 100 C 7
Mint Hill D 4
Misenheimer 200 E 3
Mocksville 1909 D 3
Momeyer 200 J 3
Moncure 500 G 3
Monroe 10,140 E 5
Montague 100 K 6
Montezuma 75 C 7
Mooresboro B 4
Mooresville 7,121 D 3
Moravian Falls 375 C 2
Morehead City 5,144 M 5
Morganton 8,311 B 3
Morrisville 221 H 3
Mortimer 13 B 2
Morven 601 E 5
Mount Airy 7,192 D 1
Mount Gilead 1,201 F 4
Mount Holly 2,241 D 4
Mount Mourne 232 D 3
Mount Olive 3,732 K 4
Mt. Pleasant 1,019 E 4
Mt. Vernon Sprs. 90 G 3
Mount Zion 100 D 7
Moyock N 1
Murfreesboro 2,140 M 2
Murphy 2,433 C 9
Nags Head O 3
Nakina 350 H 6
Nantahala 125 C 8
Nashville 1,302 K 3
Nathans Creek 75 E 6
Navassa 500 J 6
Nebo B 3
Needmore 200 C 8
Neuse 80 H 3
New Bern 15,812 L 4
New Holland 50 N 4
New London 285 E 4
Newhill 232 H 3
Newhope 25 C 2
Newland 425 C 7
Newport 676 M 5
Newton 6,039 C 3
Newton Grove 374 J 4
Norlina 874 J 2
Norman 300 F 4
North Cove 500 B 3
North Harlowe 300 M 5
N. Lumberton 423 H 5
N. Wilkesboro 4,379 C 2
Northside 100 H 2
Norwood 1,735 E 4
Oak City 518 L 3
Oak Ridge 500 F 2
Oakboro 631 E 4
Oakland 200 E 9
Oakley 58 L 3
Ocracoke 600 O 4
Old Dock 300 H 6
Old Fort 771 A 3
Old Trap 380 O 2
Olin 60 D 3
Olivia 450 G 4
Olyphic 50 H 7
Orange 50 H 4
Oriental 590 M 4
Orrum 162 G 6
Oteen 1,000 E 8
Otto 100 C 9
Overhills 50 G 4
Oxford 6,685 H 2
Pactolus 265 L 3
Paint Gap 200 B 7
Palmyra 67 L 2
Pantego 275 M 3
Parker 50 D 6
Parkersburg 114 J 5
Parkton 527 H 5
Parmele 406 L 3
Parsonville 250 E 6
Paschall 75 J 1
Passion 196 F 9
Patterson 195 B 3
Peachland 485 E 5
Pee Dee 200 F 5
Peletier L 5
Pelham 200 G 1
Pembroke 1,212 G 5
Pendleton 88 L 2
Penrose 350 E 8
Pensacola 150 B 8
Peoria 300 C 6
Phoenix J 6
Pike Road 250 M 3
Pikeville 464 J 4
Pilot Mtn. 1,092 D 2
Pine Hall 575 F 2
Pine Level 602 J 4
Pinebluff 575 F 4
Pinehurst 1,016 F 4
Pineola 350 C 7
Pinetops 1,031 K 3
Pinetown 301 M 3
Pineview 175 G 4
Pineville 1,373 D 4
Piney Creek 35 E 5
Pink Hill 386 K 4
Pinnacle 450 E 2
Pisgah 60 F 3
Pisgah Forest 900 E 9
Pittsboro 1,094 G 3
Pleasant Hill 200 K 1
Plumtree 300 C 7
Plymouth 4,486 M 3
Point Harbor 110 O 2
Polkton 459 E 4
Pollocksville 420 L 5
Pomona 1,500 F 2
Ponzer 110 N 3
Poplar 575 B 7
Poplar Branch 325 O 2
Pores Knob 150 C 2
Portsmouth 15 N 4
Postell 120 B 9
Powells Point 375 O 2
Powellsville 250 M 2
Prentiss 100 D 9
Price 175 F 1
Princeton 608 J 4
Princeville 919 L 3
Proctorville 232 H 6
Prospect Hill 110 G 2
Pungo 200 M 3
Purlear 60 E 6
Purvis G 5
Quitsna 210 L 3
Radical 50 E 6
Raeford 2,030 G 5
RALEIGH 65,679 H 3
Ramsaytown 100 B 7
Ramseur 1,134 F 3
Randleman 2,066 F 3
Ranger 150 B 9
Ransomville 170 M 4
Raynham 30 G 5
Red Oak 250 J 2
Red Springs 2,245 G 5
Reddies River 175 E 6
Reese 1,450 C 6
Reidsville 11,708 F 2
Relief 129 B 7
Rennert G 5
Rex 180 H 5
Reynolda 300 E 2
Rhodhiss 923 *B 3
Rich Square 971 L 2
Richfield 237 E 4
Richlands 877 K 5
Ridgeville 45 G 2
Ridgeway 250 J 2
Ringwood 60 K 2
Roanoke Rapids 8,156 K 2
Roaring Gap D 2
Roaring River 350 C 2
Robbins 1,158 F 4
Robbinsville 515 C 8
Roberdell 451 F 5
Robersonville 1,414 L 3
Rockfish 150 G 5
Rockford 225 D 2
Rockingham 3 356 F 5
Rockwell 852 E 3
Rocky Mount 27,697 K 3
Rocky Point 450 K 6
Rodanthe 86 P 3
Rolesville 288 J 3
Rominger 200 C 6
Ronda 545 D 2
Roper 793 M 3
Roseboro 1,241 J 5
Rosehill 896 K 5
Rosindale 35 J 6
Rosman 535 E 9
Rougemont 300 G 2
Rowland 1,293 G 5
Roxboro 4,321 H 2
Roxobel 394 L 2
Royal 250 M 4
Royall Cotton Mills 250 H 2
Ruffin 530 F 2
Rufus 80 B 3
Rural Hall 1,200 E 2
Ruth 324 A 4
Rutherford College 750 B 3
Rutherfordton 3,146 A 4
Ryland 50 M 2
Saint Pauls 2,251 H 5
Salemburg 435 J 4
Salisbury 20,102 D 3
Salter Path 300 M 5
Saluda 547 F 9
Salvo 77 P 3
Sandy Ridge 200 E 1
Sanford 10,013 G 4
Sapphire 50 E 9
Saratoga 366 *K 3
Saxapahaw 660 G 3
Scaly 200 D 9
Scotland Neck 2,730 L 2
Scotts 50 D 3
Scotts Hill 150 K 6
Scottville 180 E 5
Scranton 125 N 4
Seaboard 745 K 1
Seagrove 319 F 3
Sealevel N 5
Selma 2,639 J 3
Semora 250 G 2
Senia 25 C 7
Seven Springs 197 K 4
Severn 340 L 2
Sevier 130 A 3
Shallotte 493 J 7
Shannon 150 G 5
Sharpsburg 415 K 3
Shawboro 150 N 2
Shelby 15,508 C 4
Shelmerdine 32 L 4
Sherwood 350 D 6
Shoals 250 E 2
Shooting Creek 260 C 9
Shulls Mills 175 D 7
Siler City 2,501 G 3
Siloam 250 D 2
Silverdale L 5
Simpson (Chicod) 278 L 3
Sims 207 J 3
Skyland 1,200 E 8
Sly D 6
Smithfield 5,574 J 3
Smithtown 182 E 2
Smyrna 200 M 5
Sneads Ferry 125 L 5
Snow Camp 90 G 3
Snow Hill 946 K 4
Snowden 85 N 2
Sophia 200 F 3
South Creek 108 M 4
South Mills 500 N 2
S. Wadesboro 390 E 5
Southern Pines 4,272 G 4
Southmont 500 E 3
Southport 1,748 J 7
Southside 250 C 4
Sparta 820 C 1
Spear 445 C 7
Speed 103 L 3
Spencer 3,242 D 3
Spies 100 F 4
Spindale 3,891 B 4
Spray 5,542 F 1
Spring Hope 1,275 K 3
Spring Lake 3,500 H 4
Springfield 50 E 6
Spruce Pine 2,280 C 7
Stacy 302 N 5
Staley 236 F 3
Stanfield 350 E 4
Stanley 1,644 C 4
Stantonsburg 627 K 3
Star 677 F 4
State Road 475 D 2
Statesville 16,901 D 3
Stecoah 160 C 8
Stedman 424 H 4
Steeds 50 F 4
Stella 100 L 5
Stem 217 H 2
Stokes 217 L 3
Stokesdale 400 F 2
Stoneville 786 F 2
Stonewall 272 M 4
Stony Point 1,020 C 3
Stovall 410 H 2
Straits 100 M 5
Stratford 16 E 5
Stumpy Point 300 O 3
Sturgills D 5
Sugar Grove 225 C 6
Suit 150 B 9
Summerfield 923 F 2
Summit 50 E 6
Sunbury 350 M 2
Supply 207 J 6
Surf City 40 L 6
Swannanoa 1,800 F 8
Swanns 30 G 4
Swanquarter 212 N 4
Swansboro 559 L 5
Sylva 1,382 D 8
Tabor City 2,033 H 6
Tamarack 150 D 6
Tapoco 100 B 8
Tarboro 8,120 K 3
Tarheel 200 H 5
Taylorsville 1,310 C 3
Teacheys 226 J 5
Terrell 200 C 3
Thomasville 11,154 E 3
Thurmond 77 D 2
Tillery 250 K 2
Timberlake 200 H 2
Timberland 11 G 4
Toast 1,401 D 2
Todd 89 D 6
Toecane 250 B 7
Toliver D 6
Tomahawk 30 J 5
Topia 69 E 5
Topton 125 C 9
Townsville 219 J 1
Traphill 150 D 2
Trenton 469 L 4
Trinity 764 F 3
Triplett 120 D 6
Troutmans 613 D 3
Troy 2,213 F 4
Tryon 1,985 A 4
Tunis 200 M 2
Turkey 223 J 4
Turnersburg 75 D 3
Tyner 150 M 2
Ulah F 3
Unaka B 9
Union 340 L 2
Union Grove 125 D 2
Union Mills 200 B 3
Unionville 124 E 4
University G 2
Upton 93 D 7
Uree 100 A 4
Vade Mecum E 2
Valdese 2,730 B 3
Vale 200 C 3
Valle Crucis 200 C 6
Vanceboro 753 L 4
Vandemere 475 M 4
Vannoy 25 E 6
Varina 593 H 3
Vass 757 G 4
Vaughan 181 J 2
Vein Mountain 75 A 3
Verona 125 K 5
Vilas 60 C 6
Waco 310 *C 4
Wade 400 H 4
Wadesboro 3,408 E 5
Wadeville E 4
Wagoner 200 E 6
Wagram 397 G 5
Wake Forest 3,704 H 3
Walkertown 1,000 E 2
Wallace 1,622 J 5
Wallburg 165 E 3
Walnut 450 E 7
Walnut Cove 1,132 E 2
Walstonburg 177 K 3
Wanchese 1,000 O 3
Warne 200 C 9
Warren Plains 100 J 2
Warrensville 120 E 6
Warrenton 1,166 J 2
Warsaw 1,598 J 4
Washington 9,698 M 3
Washington Pk. 421 M 3
Watha 222 J 5
Waves 65 P 3
Waxhaw 818 D 5
Waynesville 5,295 E 8
Weaverville 1,111 E 8
Webster 142 D 8
Weeksville 225 N 2
Welcome 600 E 3
Weldon 2,295 K 2
Wendell 1,253 J 3
Wenona M 3
Wentworth 100 F 2
West End 850 F 4
West Jefferson 871 D 6
Westfield 300 D 2
Wests Mill 50 D 9
Whitakers 962 K 2
White Lake 400 H 5
White Oak 125 H 5
White Plains 500 D 2
Whitehall (Seven Springs) 197 K 4
Whitehead 250 E 6
Whiterock 100 E 7
Whiteville 4,238 H 6
Whitnel 1,405 B 3
Whittier 400 D 8
Wilkesboro 1,370 C 2
Willard J 5
Williamston 4,975 M 3
Wilmington 45,043 J 6
Wilson 23,010 K 3
Wilsons Mills 349 H 3
Windom 100 B 7
Windsor 1,781 L 2
Winfall 421 N 2
Wingate 793 E 5
Winnabow 250 J 6
Winston-Salem 87,811 E 2
Winterville 870 L 3
Winton 834 L 2
Wise 300 J 2
Wolf Mountain 25 D 9
Wood 128 J 2
Woodard 325 M 3
Woodland 590 L 2
Woodleaf 500 D 3
Woodsdale 200 H 2
Woodville 387 L 2
Worthville 550 F 3
Wrightsville Beach 711 K 6
Wrightsville Sound 500 K 6
Yadkin College 82 E 3
Yadkin Valley 12 C 2
Yadkinville 820 D 2
Yanceyville 2,391 G 2
Yellowcreek 4 B 8
Youngsville 619 J 2
Zebulon 1,378 J 3
Zionville 250 D 6
Zirconia E 9

*No room on map for name.

THE LEADER IN TOBACCO MANUFACTURES



Tobacco manufacturing is one of the most important industries in the state. North Carolina leads the states in producing tobacco products. The Ecusta Paper Company at Brevard is one of the largest manufacturers of cigarette paper in the world.

North Carolina ranks first among the states in the production of this crop, raising about 40 per cent of the nation's tobacco. Corn, the second most important crop, is grown throughout the state. Cotton is grown chiefly in the Piedmont and on the coastal plain. Other important farm products are milk, hogs, chickens, eggs, hay, peanuts, and potatoes.

Sawmills and Mines in North Carolina

Forests cover about two thirds of North Carolina. The coastal plain has chiefly pines, but in the Piedmont they are mixed with hardwoods such as oak, ash, hickory, and poplar. The trees of the mountain region are mainly hardwoods. The production of lumber and wood products from these forests is one of the state's important industries.

North Carolina has many minerals but not in great quantities. Its leading minerals are stone, sand and gravel, tungsten, talc, pyrophyllite, ground soapstone, olivine, asbestos, and clays. North Carolina is the leading producer of feldspar and mica. Until the discovery of gold in California, North Carolina was the chief gold-producing state, but very little gold is now mined. With little fuel deposits, the state depends upon other states for coal and petroleum.

FIRST IN TOBACCO GROWING



North Carolina not only is the first state in tobacco manufactures, it is also the principal grower of tobacco. Here tobacco dries in the Smokies before being carried to the barns.

Known for Textiles and Tobacco Products

In 1900 North Carolina was almost solely an agricultural state. Since then it has become an important manufacturing state as well. About 28 per cent of its gainfully employed people now work in factories.

Today North Carolina ranks 14th among the states in the value of its manufactured goods. It is second only to Texas among the states of the South. North Carolina's foremost industry is the manufacture of textile-mill products. This industry, in which the state leads the nation, accounts for half of the total manufacturing and employs more than half of all industrial workers. The main products are cotton fabrics, yarns, threads, and knitted goods. It is the leading state in the manufacture of seamless hosiery.

North Carolina also ranks first among the states in the production of cigarettes and other tobacco products. In the manufacture of furniture it is a principal state. Other large industries are lumber, food products, chemicals, and paper products.

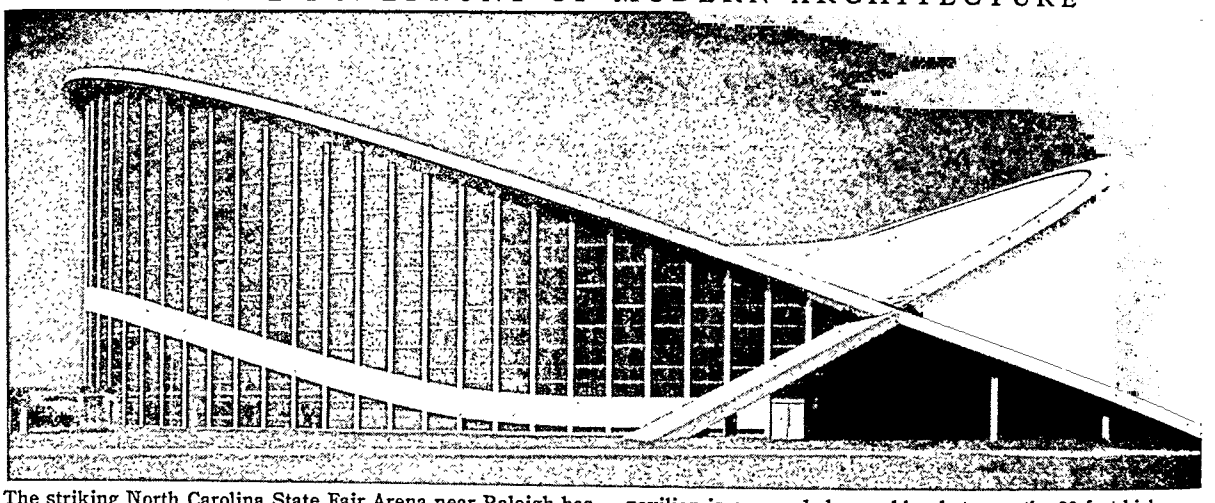
The state's development of manufacturing has been due in good part to the vast water power of its hundreds of mountain streams and waterfalls. Hiwassee, Fontana, and Apalachia dams are part of the Tennessee Valley Authority. Cheoah, Santeelah, Glenville, and Nantahala dams are privately owned projects. In developed water power, North Carolina ranks sixth in the nation.

Largest Cities Are on Piedmont Plateau

The largest city, Charlotte, is in the south central part of the state near the South Carolina border. It is the commercial hub of the Piedmont and one of the state's largest textile centers (*see* Charlotte).

Winston-Salem, in the north Piedmont, is two cities which consolidated into one. It has large tobacco manufactures. Durham, in the north central part of the state, is noted for its many cigarette factories and is the home of Duke University. Greensboro, 50 miles northwest, produces cotton and rayon textiles.

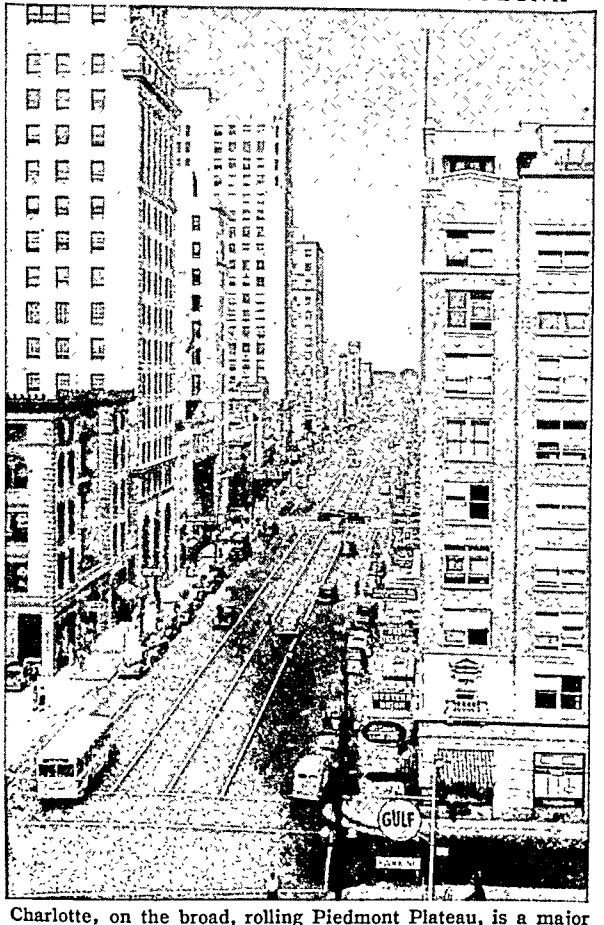
IN THE FOREFRONT OF MODERN ARCHITECTURE



The striking North Carolina State Fair Arena near Raleigh has won architectural awards. The roof of this livestock judging pavilion is suspended on cables between the 90-foot high parabolic arches to give the spectators an unobstructed view.

Asheville is widely known as a winter and summer resort. It is situated in the heart of the mountain section where the scenery is impressive. Its chief manufactures are textiles and furniture. Raleigh, the state capital, lies in the center of the state.

METROPOLIS OF NORTH CAROLINA



Charlotte, on the broad, rolling Piedmont Plateau, is a major distributing and manufacturing center of the Southeast.

Its name commemorates the colony's founder, Sir Walter Raleigh. This historic city is also an important trade center (*see* Raleigh).

High Point, also in the Piedmont region, is noted for its furniture factories and hosiery and textile mills. Wilmington, near the mouth of Cape Fear River, is the state's chief seaport. Rocky Mount, in the east, is a cotton and tobacco market. Fayetteville, south of Raleigh, has textile and lumber mills.

Sir Walter Raleigh in the State's Early History

English colonization began with the expedition sent out by Sir Walter Raleigh in 1584. It explored the Carolina coast between Pamlico and Albemarle sounds. The favorable report led Raleigh the next year to send over a party of colonists who settled on Roanoke Island. Conflicts with the Indians soon caused them to return to England.

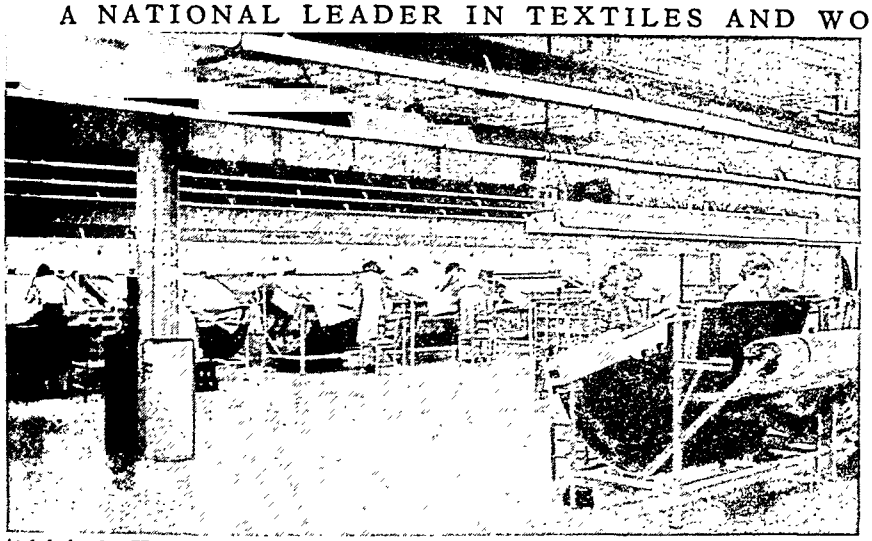
In 1587 Raleigh sent a second party under John White as governor. White's granddaughter, Virginia Dare (born Aug. 18, 1587) was the first English child born in America. After three years' absence in England to get supplies, Governor White returned to Roanoke. He found that all the settlers including his daughter and little granddaughter had disappeared. The fate of this colony, the "lost colony," was never known. The only clue, which proved useless, was the word "Croatan" carved on a tree.

Carolina Is Divided in Two

Under a grant from Charles I (for whom Carolina was named) further efforts at colonization were made, but they failed. Later, in 1663, Charles II granted the region to a group of eight "lords proprietors." The colony prospered but settlers became discontented over feudal laws and neglect by the owners. Finally in 1730 North and South Carolina were divided into separate provinces.

During the first half of the 1700's Scotch-Irish and German settlers began to come into the back country from Pennsylvania (*see* American Colonies). In 1710 Baron Christopher de Graffenreid established a colony of Swiss emigrants and German Protestant ref-

A NATIONAL LEADER IN TEXTILES AND WOODEN FURNITURE



At left is the Hatch Mill near Columbus, one of the modern plants that make North Carolina the principal textile state.



At right is one of the many furniture factories in the state. North Carolina leads the nation in making wooden furniture.

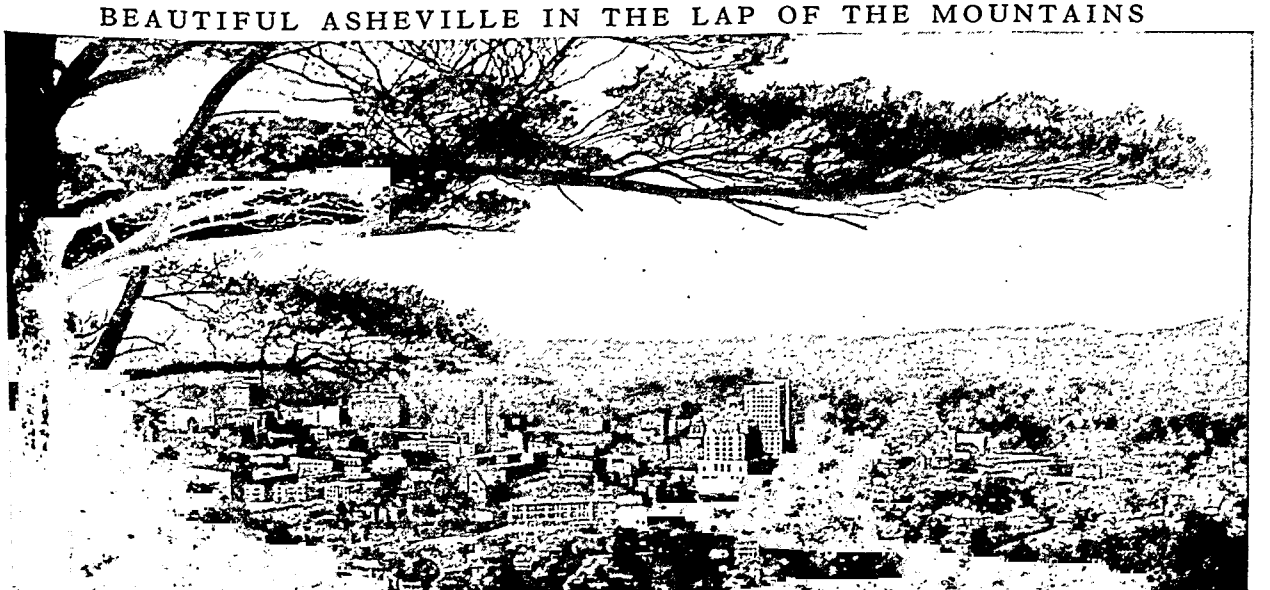
ugees from the Palatinate. He selected a site on the Trent River and called it New Bern. The next year the Tuscarora Indians killed 130 of the pioneer settlers and then, moving north, attacked the Albemarle Sound Communities. Only after two years of bitter warfare were the Indians driven out. Many Highland Scots came to North Carolina after their defeat at the battle of Culloden Moor in 1746. Along with settlers from neighboring colonies, they made up the 300,000 North Carolina residents who had spread from the seacoast to the Appalachians before the outbreak of the American Revolution.

These North Carolina colonists were an independence-loving people. Their resistance nullified the Stamp Act in the territory (*see* Stamp Act). In the western counties a group of pioneers, known as the "Regulators," rebelled in 1768 against the taxes and methods of royal officials. They were defeated by Governor Tryon in a battle along Alamance Creek, May 16, 1771. Yet the struggle against unfair and oppressive treatment continued under such rebel leaders as George Durant, Thomas Pollock, Edward Moseley, Hugh Waddell, and Cornelius Harnett.

The Fight for Independence

In the face of strong opposition from the royal governor, Josiah Martin, North Carolinians organized a provincial congress, Aug. 25, 1774. It developed plans for a temporary government. When news of the battle of Lexington came, citizens of Mecklenburg County met at Charlotte. According to local history, on May 20, 1775, they drew up the first declaration of independence in the colonies, the "Mecklenburg Declaration of Independence." This date is on the state seal and flag. More certain of proof, however, was a meeting on May 31 in Charlotte, which adopted more moderate resolutions, the Mecklenburg Resolves.

BEAUTIFUL ASHEVILLE IN THE LAP OF THE MOUNTAINS



Viewed from Beaucatcher Mountain, Asheville is a city of office buildings, hotels, and tree-shaded homes. This mountain metropolis is a year-round resort located on a 2,300-foot plateau between the Blue Ridge and Great Smoky mountain ranges.

North Carolina's militia gained a victory over government troops at Moore's Creek Bridge, Feb. 27, 1776. On April 12, North Carolina's provincial congress directed its delegates to the Continental Congress to vote for independence. North Carolina was the first colony to take this important step to freedom.

Following the adoption of a state constitution, Dec. 18, 1776, Richard Caswell was elected the first governor. During the Revolution there was constant fighting between patriots and Tories.

In 1780–81 Cornwallis led three armies into North Carolina. The frontier rebels defeated the British at Kings Mountain in South Carolina, October 1780. Cornwallis won the battle of Guilford Court House, March 15, 1781; but his losses there helped force his surrender at Yorktown.

North Carolina's delegates were prominent at the federal Constitutional Convention in Philadelphia. Yet the state refused to ratify the new constitution until Nov. 21, 1789. This date was after the first ten amendments containing the so-called "bill of rights" had been introduced in Congress and six months after Washington's inauguration as president.

In 1790 the state ceded to the federal government its western section (now Tennessee), which had unsuccessfully tried to form the "State of Franklin" (*see* Sevier). In 1792 the city of Raleigh was laid out as the permanent capital. In the period before the Civil War two presidents were born in the state—James K. Polk and Andrew Johnson.

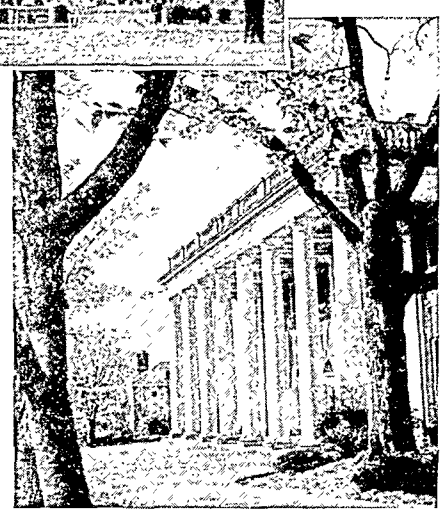
North Carolina did not secede from the Union and join the Confederacy until after the fall of Fort Sumter in 1861 (*see* Civil War, American). Then it furnished such leaders as Gens. D. H. Hill, James J. Pettigrew, and Bryan Grimes.

Wilmington served as the central landing place for supplies run through the Northern blockade. It was also the last port closed by the Federal navy. The state was the scene of the last struggles of the Civil War. On April 26, 1865, Gen. Joseph E. Johnston surrendered to General Sherman at Durham's Station.

Even during the Civil War Gov. Zebulon B. Vance took a strong stand for state's rights against attempts of the Confederate government to extend its powers. After the war, the state rid itself of the "carpetbaggers" and began its reconstruction. (*See also* Reconstruction Period; chronology in North Carolina Fact Summary.)

FAMOUS UNIVERSITIES





At top is a view of the Woman's College of Duke University at Durham. At bottom is the Graham Memorial Student Building at the University of North Carolina at Chapel Hill.

Education and Recreation

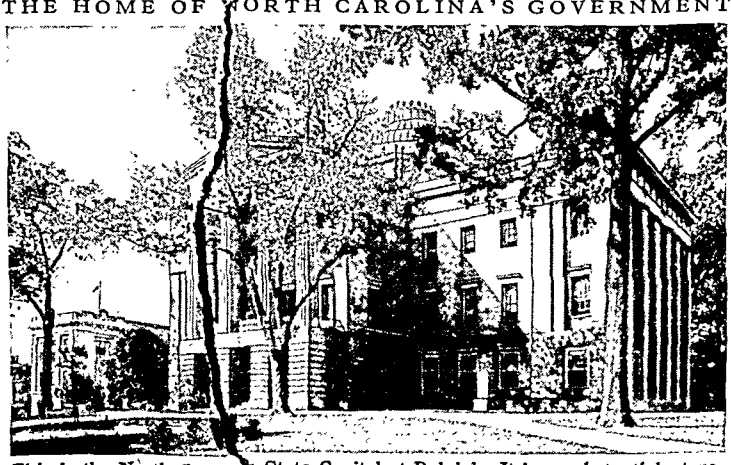
The University of North Carolina, the first state university to be opened (1795), has three units—the university proper at Chapel Hill, the Woman's College at Greensboro, and the State College of Agriculture and Engineering at Raleigh. The state also has six teachers colleges.

Duke University, at Durham, is the largest private college in the state and one of the most richly endowed in the nation. It was built around Trinity College through gifts of James B. Duke. He was a tobacco king and a leader in the water-power development of the state.

In the early 1900's Gov. Charles B. Aycock led a campaign for more public schools, including consolidated schools. Governor Aycock and his successors also built a large network of fine surfaced roads.

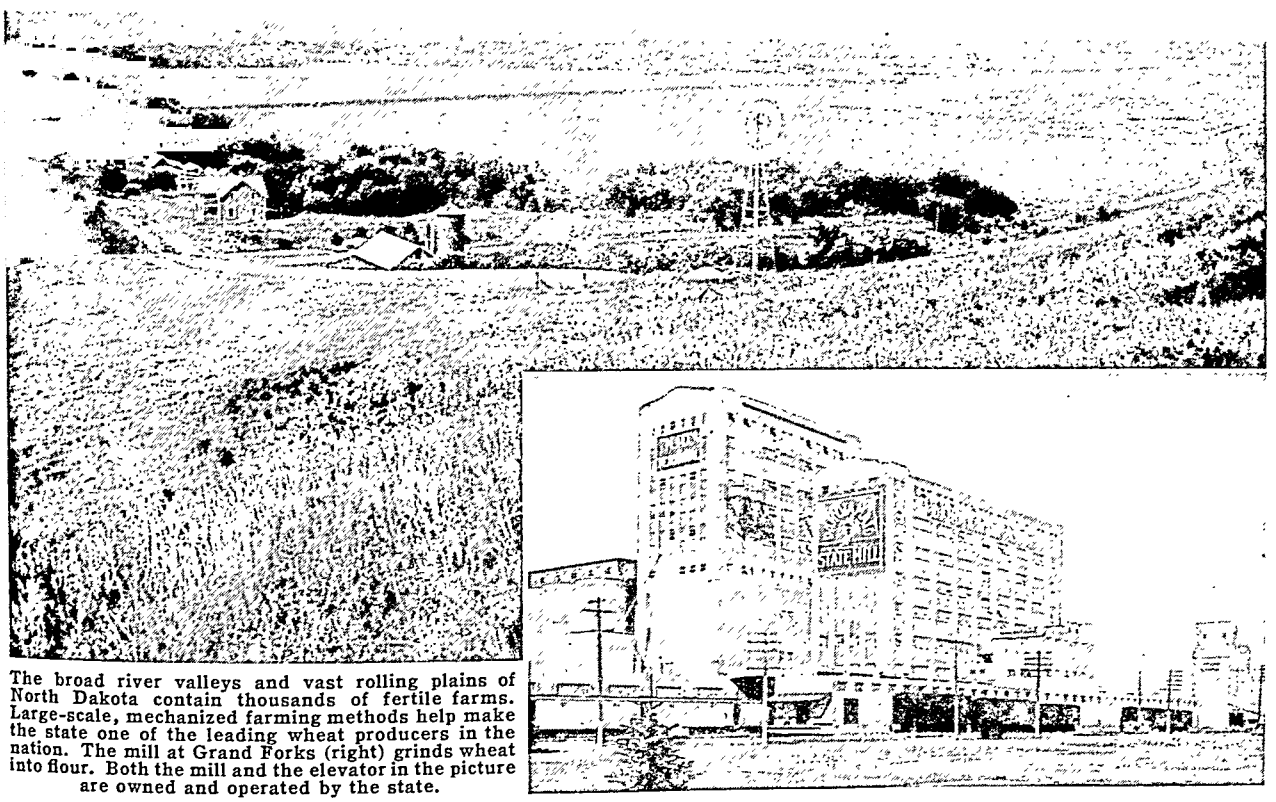
North Carolina is called the "variety vacationland" for its varied recreation spots. The tourist trade is a major industry. In the mountains are Great Smoky Mountains National Park and Blue Ridge Parkway. Fishing and beaches are coastal attractions. There are also numerous forests, state parks, and resorts. (*See also* United States, section "The South.")

THE HOME OF NORTH CAROLINA'S GOVERNMENT



This is the North Carolina State Capitol at Raleigh. It is a substantial structure built 1840 of granite from a nearby quarry.

The WHEAT-CLAD PLAINS *of* NORTH DAKOTA



The broad river valleys and vast rolling plains of North Dakota contain thousands of fertile farms. Large-scale, mechanized farming methods help make the state one of the leading wheat producers in the nation. The mill at Grand Forks (right) grinds wheat into flour. Both the mill and the elevator in the picture are owned and operated by the state.

NORTH DAKOTA. In this state, plains and fertile prairies stretch as far as the eye can see. Most of the land has fine soil, with few trees or rocks to hamper cultivation. Hence the state looks like one vast farm with towns here and there.

The surface of North Dakota is an almost unbroken plain. From east to west the land rises about half a mile in three broad steps. The lowest and smallest step is the level valley of the Red River. The second, about 300 feet higher, is called the Drift Prairie. The third and highest step is the Missouri Plateau. This covers nearly half the state.

Features of the Land

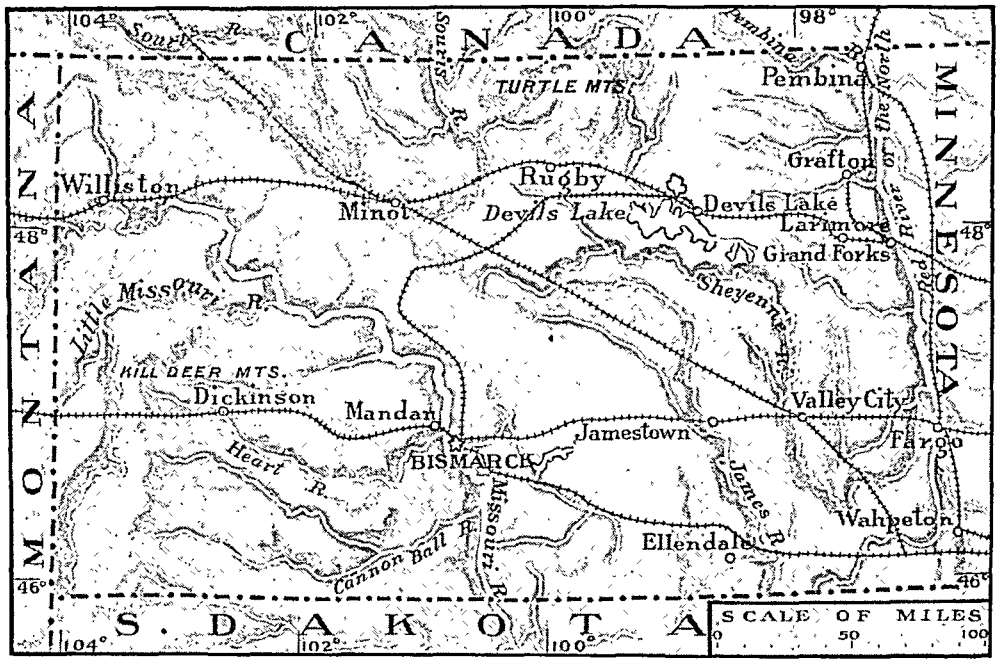
The Red River valley is not a true valley but the floor of an ancient glacial lake, Lake Agassiz (*see* Red River). The part within North Dakota is about 40 miles wide in the north and 10 miles wide in the south. The soil is rich and the valley early became famous for wheat. The wheat farms, once much larger, have been cut into plots averaging about 400 acres. Today there is a variety of crops and livestock.

The soil of the Red River valley is much more fertile than that of the Drift Prairie to the west. The Drift Prairie takes its name from the deposits of drift left in the Ice Age (*see* Ice Age). On the Canadian border rises a low plateau called the Turtle Mountains. Just west of them is the big bend of the Souris River. Like the Red River, the Souris flows through a former lake bed. South of the Turtle Mountains is salty Devils Lake, largest in the state. Hundreds of small lakes dot this region. South of Devils Lake is Sheyenne River, a tributary of the Red River. Further south is the James River, a branch of the Missouri.

The Missouri Plateau escaped being covered by glaciers. This region is part of the semiarid western plains. Almost all of it is underlaid by lignite or brown coal. Flat-topped hills, called buttes, rise 300 to 400 feet above the rolling surface. The Missouri River runs diagonally across the plateau from the northeast through a deep trenchlike valley. Early French explorers named the part of the plateau along the east side of the river Côteau du Missouri—the hill of the Missouri.

Rainfall on the plateau is light and the crop yield an acre is low. Grazing land alternates with fields of forage crops. The average farm covers 800 acres but produces only about as much as 400 acres in the eastern part of the state.

THE VAST LOW PLAINS AND VALLEYS OF NORTH DAKOTA



North Dakota has three regions—the fertile grain-growing prairies in the east drained by the Red River, the low plateau east of the Missouri, and the great plains west of that river. The last two are suited for grazing. The Turtle Mountains are in the north and the Bad Lands in the southwest.

In the southwest corner of the plateau are the hilly Bad Lands, named by pioneers who found them difficult to cross. Here the Little Missouri River, wind, frost, and rain have carved clay and sand into grotesque shapes. Fires in the extensive beds of lignite coal have burned and melted the surface and produced weird colors. In the Bad Lands stands the state's highest peak, the 3,468-foot high Black Butte.

Mineral Riches from the Earth's Depths

Lignite, called brown coal, underlies about 32,000 square miles in the western part of the state. Once it was thought to have little value, but today it is useful for power and heat. Lignite can be made into small bricks, called *briquettes*. They have about twice as much heat value for each ton as raw lignite, but less than bituminous coal. The manufacture of briquettes yields such important by-products as gas, oil, and tar. In the lignite-producing districts are high-grade clays for pressed bricks, firebrick, and pottery. In 1951 petroleum was discovered near Tioga. The Williston Oil Basin has prospects of becoming a major oil field in the United States. Sand and gravel, stone, and natural gas are also of value.

Temperature and Rainfall Vary

North Dakota has a wide range of temperature. In winter the average is about 10°F., with extremes of −40° to −60°F. In summer the average is about 67°, with a record high of 121°. The dry clear air makes the extreme temperatures not too uncomfortable. The growing season is from 110 to 130 days, varying in different parts of the state.

Rainfall averages about 22 inches a year in the Red River valley, and about 14 inches in the north and southwest. Nowhere in the state is rainfall sufficient for the growth of forests. Trees are found only along the rivers and in a few low places where the roots can tap ground water.

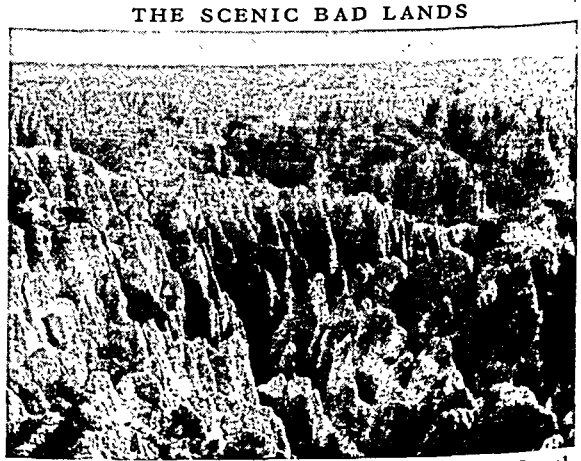
When rainfall is subnormal, droughts occur. Then windstorms carry off topsoil. A prolonged drought began in 1929 and except for one year continued through 1936. Federal and state agencies and private groups undertook soil conservation, planting of soil-holding grasses, and irrigation projects (*see* Drought).

Largest of the water conservation projects is the giant Garrison Dam on the Missouri River (*see* Missouri River). It is a key unit of the vast Missouri River Basin development program. Its height of 210 feet and length of 12,000 feet make it the world's largest rolled earth-filled dam. Benefits from the dam include flood control, irrigation, navigation, power, recreation, and wildlife preservation. Other projects for water resources control are Baldhill Dam on the Sheyenne River, Dickinson and Heart Butte dams on the Heart River, and Homme Dam on the Park River.

Abundance from the Soil

North Dakota is primarily an agricultural state. About 90 per cent of its land is in crops and pasture. Almost half the workers are employed on farms.

THE SCENIC BAD LANDS



Winds and waters have carved the fantastic Bad Lands. Its valleys, however, are fertile and cattle graze on level portions.

Continued on page 291

North Dakota Fact Summary

NORTH DAKOTA (N.D.): Named for Indians who once roamed territory. They called themselves "Lakotas" or "Dakotas," meaning friends or allies.

Nickname: "Flickertail State," from the "flickertail" ground squirrel once common in the state; also "Sioux State," for Sioux Indian tribes.

Seal: Wheat bundles around tree trunk symbolize agriculture; Indian on horseback is pursuing a buffalo.

Motto: Liberty and Union, Now and Forever, One and Inseparable.

Flag: For description and illustration, *see* Flags.

Flower: Wild prairie rose. **Bird:** Western meadowlark. **Tree:** American elm. **Song:** 'North Dakota Hymn'—words, James Foley; music, C. S. Putnam.

THE GOVERNMENT



Capital: Bismarck (since 1883, when it became territorial capital).

Representation in Congress: Senate, 2; House of Representatives, 2. Electoral votes, 4.

Legislative Assembly: Senators, 49; term, 4 years. Representatives, 113; term, 2 years. Convenes Tues. after the 1st Mon. of Jan. in odd years. Session limit: 60 days.

Constitution: Adopted 1889. Proposed amendment must be (a) passed by a two-thirds vote of each legislative house, or by initiative action of the people, and (b) ratified by a majority voting on amendment.

Governor: Term, 2 years. May succeed himself.

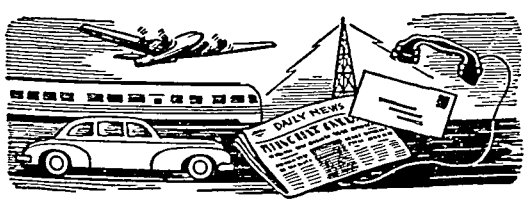
Other Executive Officers: Lieut. governor, secy. of state, attorney general, treasurer, auditor, commissioner of insurance, commissioner of agriculture and labor and superintendent of public instruction; terms, 2 years; 3 public service commissioners; term, 6 years; tax commissioner; term, 4 years; all elected.

Judiciary: Supreme court—5 justices, elected at large; term, 10 years. District courts—6; 15 judges, elected; term, 6 years. County courts—1 in each county; judge elected; term, 2 years.

County: 53 counties, each governed by a board of commissioners, usually of 3 or 5 members. Boards and officers elected; term, 2 years.

Municipal: Mayor and council form most common.

Voting Qualifications: Age, 21; residence in state, 1 year; in county, 90 days; in precinct, 30 days.



TRANSPORTATION AND COMMUNICATION

Transportation: Railroads, 5,300 miles. First railroad, Northern Pacific, Moorhead, Minn., to Fargo, N.D., March 1872. Rural roads, 114,000 miles. Airports, 130.

Communication: Periodicals, 16. Newspapers, 128. First newspaper, *Frontier Scout*, Fort Union, 1864. Radio stations (AM and FM), 16; first station, WDAY, Fargo, licensed May 23, 1922. Television stations, 1; WDAY-TV, began operation June 1, 1953. Telephones, 140,000. Post offices, 596.

THE PEOPLE AND THEIR LAND

Population (1950 census): 619,636 (rank among 48 states —41st); urban, 26.6%; rural, 73.4%. Density: 8.8 persons per square mile (rank—40th state).

Extent: Area, 70,665 square miles, including 608 square miles of water surface (16th state in size).

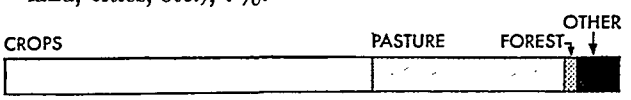
Elevation: Highest, Black Butte, 3,468 feet, near Amidon; lowest, Red River at Pembina County, 750 feet.

Temperature (°F.): Average—annual, 40°; winter, 10°; spring, 40°; summer, 67°; fall, 43°. Lowest recorded, −60° (Parshall, Feb. 15, 1936); highest recorded, 121° (Steele, July 6, 1936).

Precipitation: Average (inches)—annual, 17; winter, 1; spring, 5; summer, 8; fall, 3. Varies from about 22 in southeast to about 14 at central part of northern boundary and in the extreme southwest.

Natural Features: From east to west the land rises in three broad steps—the level valley of the Red River; the low, rolling hills of the Drift Prairie (Glacial Drift Plains); and the Missouri Plateau of the Great Plains region. Principal rivers: James, Little Missouri, Missouri, Red River, Sheyenne, Souris.

Land Use: Cropland, 60%; nonforested pasture, 31%; forest, 2%; other (roads, parks, game refuges, wasteland, cities, etc.), 7%.



Natural Resources: *Agricultural*—great stretches of fertile soil; broad plains for stock grazing; numerous artesian wells; long, productive growing seasons. *Industrial*—large lignite coal and oil reserves; sand and gravel. *Commercial*—Game and fish attract tourists.

OCCUPATIONS AND PRODUCTS

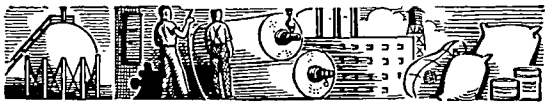
What the People Do to Earn a Living



Major Industries and Occupations, 1950

Fields of Employment	Number Employed	Percentage of Total Employed
Agriculture, forestry, and fishery	98,949	44.3
Wholesale and retail trade	39,580	17.7
Professional services (medical, legal, educational, etc.)	18,812	8.4
Transportation, communication, and other public utilities	15,577	7.0
Construction	11,256	5.0
Government	8,336	3.7
Personal services (hotel, domestic, laundering, etc.)	7,823	3.5
Manufacturing	6,519	2.9
Business and repair services	6,399	2.9
Finance, insurance, and real estate	4,027	1.8
Amusement, recreation, and related services	1,575	0.7
Mining	756	0.3
Workers not accounted for	3,933	1.8
Total employed	223,542	100.0

North Dakota Fact Summary



What the People Produce

A. Manufactured Goods (Rank among states—48th)
Value added by manufacture* (1952), $31,201,000

Leading Industries in 1947 (with Principal Products)	Value Added by Manufacture	Rank among States
Food and Kindred Products..... Flour and meal; dairy products; meat products; bakery products	$21,848,000	42
Printing and Publishing..... Newspapers	4,865,000	43

*For explanation of value added by manufacture, *see* Census.



B. Farm Products (Rank among states—24th)
Total cash income (1952), $524,877,000

Products	Amount Produced (10-Year Average)	Rank within State*	Rank among States†
Wheat.....	137,943,000 bu.	1	2
Cattle.....	427,632,000 lbs.	2	16
Barley.....	48,604,000 bu.	3	1
Milk.....	962,000,000 qts.	4	19
Flaxseed.....	9,801,000 bu.	5	2
Oats.....	64,394,000 bu.	6	6
Hogs.....	235,707,000 lbs.	7	20
Corn.....	25,856,000 bu.	8	24

*Rank in dollar value †Rank in units produced



C. Minerals (Fuels, Metals, and Stone)
Annual value (1951), $10,246,000
Rank among states—43d

Minerals (1951)	Amount Produced	Value
Coal (lignite).....	3,224,000 tons	$7,784,000
Sand and gravel...	4,573,000 tons	2,140,000

D. Trade

Trade (1948)	Sales	Rank among States
Wholesale.....	$939,420,000	34
Retail.....	608,182,000	39
Service.....	30,789,000	45

LARGEST CITIES (1950 census)

Fargo (38,256): transportation hub of rich agricultural area; iron foundries; meat packing; farm machinery.
Grand Forks (26,836): railroad division and grain-inspection point; milling; meat packing; potato products.
Minot (22,032): farm market and railroad center; grain milling; lignite mining; dairy products and poultry.
Bismarck (18,640): state capital on Missouri River; trade and shipping center for south-central area of state.
Jamestown (10,697): railroad, trade center for farm area.
Dickinson (7,469): livestock, grain market; lignite coal.
Williston (7,378): railroad center in oil, coal, farm area.
Mandan (7,298): oil industries; railroad division point.
Valley City (6,851): agricultural center; milling; dairies.

EDUCATION



Public Schools: Elementary, 2,812; secondary, 394; compulsory school age, 7 through 16. State supt. of public instruction elected, 2-year term. County supts. elected in each county, 2-year terms. Boards of education of common, special, and independent (city) school districts are elected. City supts. appointed by district boards of education.
Private and Parochial Schools: 63.
Colleges and Universities (accredited): Colleges, 10; junior colleges, 2. State-supported schools include University of North Dakota, Grand Forks; State Agricultural College, Fargo; State School of Science, Wahpeton; State School of Forestry, Bottineau; 5 teachers colleges—Dickinson, Ellendale, Mayville, Minot, and Valley City.
State Schools for the Handicapped: North Dakota School for the Blind, Bathgate; North Dakota School for the Deaf, Devils Lake; Institution for Feebleminded, Grafton.
Libraries: City and town public libraries, 83; 2 county and 1 township library. State Library Commission responsible for promoting library service. Noted special library: Masonic Library, Fargo.
Outstanding Museum: State Historical Society, Bismarck.

CORRECTIONAL AND PENAL INSTITUTIONS

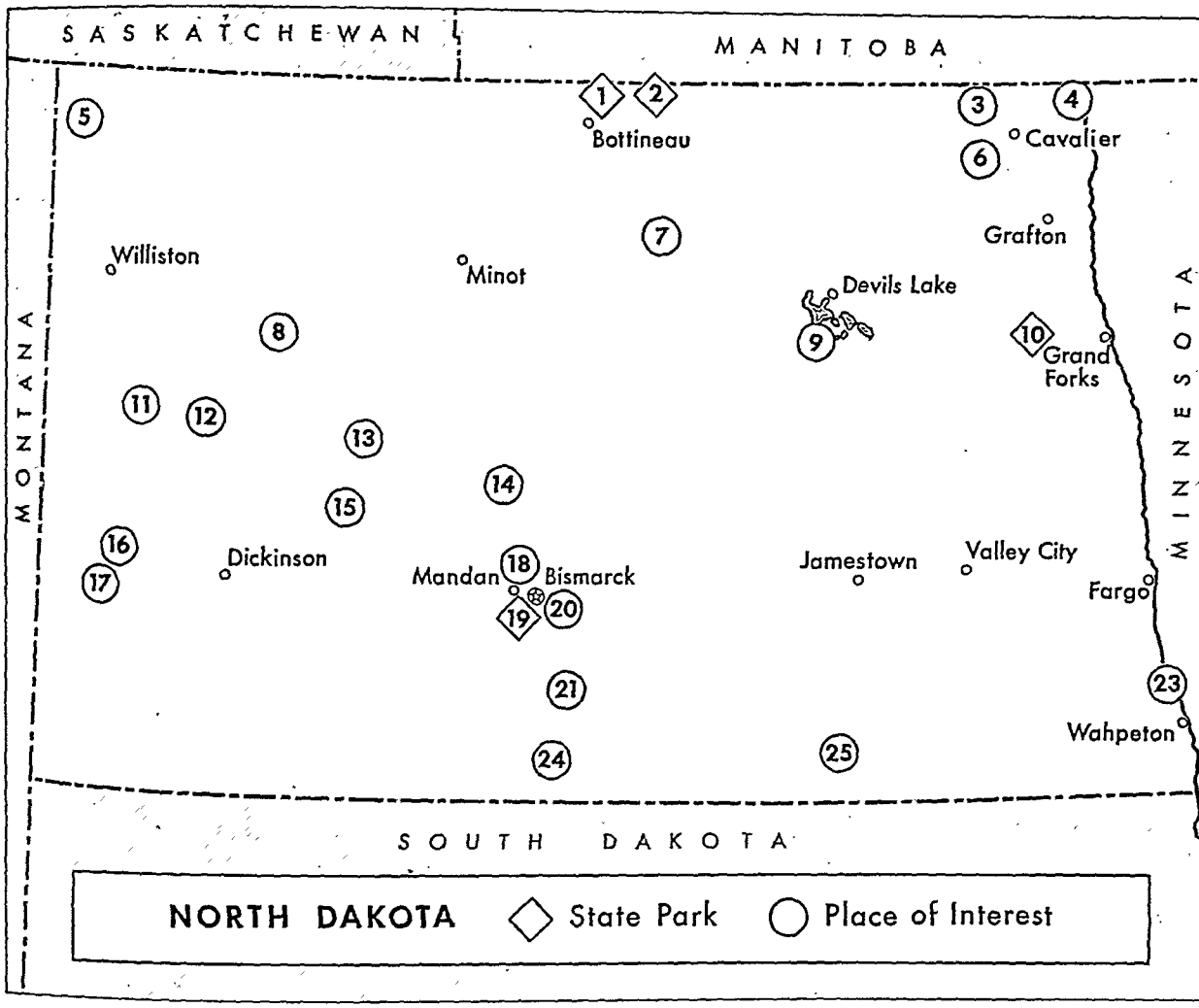
State Training School (boys and girls), Mandan; State Farm, Bismarck; State Penitentiary, Bismarck.

PLACES OF INTEREST*

Bismarck—State Capitol; T. Roosevelt's Elkhorn Ranch cabin, moved from Bad Lands (*see* Bismarck) (20).
Cannon Ball—Sioux live in native surroundings (21).
Crowley Flint Quarry—in Knife River valley; preserves well-marked flint quarry of early Indians (15).
David Thompson Historic Site—monument to pioneer geographer and fur trader; southwest of (7).
De Mores Historic Site—old chateau of Marquis de Morés who came to Medora to build state's first packing plant; memorial park contains statue of Marquis (17).
Double Ditch—east bank of Missouri River; ruins of large Indian earth-lodge village (18).
Elephant's Pass—narrow cleft in rock along climb to top of Killdeer Mts.; overlooks surrounding country (12).
Fort Abercrombie—site of first U.S. military post in state, authorized 1857; restored palisades and blockhouses; museum exhibit; memorial park (23).
Fort Rice—established by General Sully, 1864; scene of peace council with Sioux, 1868; blockhouses (21).
Garrison Dam—near Riverdale; the world's greatest rolled earth-filled dam; northwest of (14).
Geographic Center of North America—marker in Pierce County, 48°10′N. latitude, 100°10′W. longitude (7).
Grave of Sitting Bull—burial place of great Sioux chief at Fort Yates; raided by South Dakotans in 1953 for reburial near his boyhood home (24).
Log Cabin of Joseph Henry Taylor—Washburn; house built in 1870's by early North Dakota author (14).
Mountain—Icelandic town; contains one of oldest Icelandic churches on continent, built 1886 (6).
Nishu—Arikara Indian community center; circular log hall, Medicine Lodge, for holding ceremonials (13).
Pembina Historic Site—on Pembina River; marks site of early Chaboillez fur-trading post, built 1797-98 (4).

*Numbers in parentheses are keyed to map.

North Dakota Fact Summary



Sully's Hill National Game Preserve—borders Devils Lake; buffalo, elk, deer, and wild fowl (9).

Theodore Roosevelt National Memorial Park—65,569 acres in two areas, along Little Missouri R. at Medora and south of Watford City; includes colorful features of Bad Lands—buttes, petrified forests, burning coal mine; grand canyon of Little Missouri; and part of Theodore Roosevelt's Elkhorn Ranch (11, 16).

Verendrye National Monument—near Sanish; includes Crow Flies High Butte where it is believed the Vérendryes (first white men to explore interior Northwest) camped in 1738 (8).

Walhalla Park—site of fur-trading post located here by Alexander Henry, Jr.; contains original log-trading store of Norman Kittson, state's first postmaster (3).

Whitestone Hill—west of Merricourt; marks one of most important battles won against Sioux Indians (1863); soldiers' memorial; museum (25).

Writing Rock—on hill near Grenora; among best examples of boulders inscribed by prehistoric Indians (5).

STATE PARKS*†

Fort Lincoln—near Mandan; site of Fort Abraham Lincoln where Custer drilled his men before tragic battle in 1876; also site of earlier post of Fort McKeen and restored Mandan Indian village; museum (19).

International Peace Garden—half of large area extends into Canada; Cairn (stone monument) on international boundary bears nations' pledge to everlasting friendship; formal gardens; amphitheater (2).

Lake Metigoshe—water sports; large lodge; woods (1).

Turtle River—in winding valley of Turtle River; forested areas; wild-life sanctuary; near Arvilla (10).

*Numbers in parentheses are keyed to map.
†There are also 7 state recreational areas.

THE PEOPLE BUILD THEIR STATE



1682—René Robert Cavelier, Sieur de La Salle, claims Mississippi Valley for France; includes Missouri Valley.

1738—Pierre Gaultier de Varennes, Sieur de la Vérendrye, granted fur-trade rights in Northwest by France; he and sons visit Mandan Indians on the Missouri in North Dakota

1742—La Vérendrye's sons return to North Dakota t seek the ocean and a route to India.

1762—France cedes land claimed by La Salle to Spain land secretly returned to France, 1800.

1763—Treaty of Paris gives part of North Dakota t Great Britain.

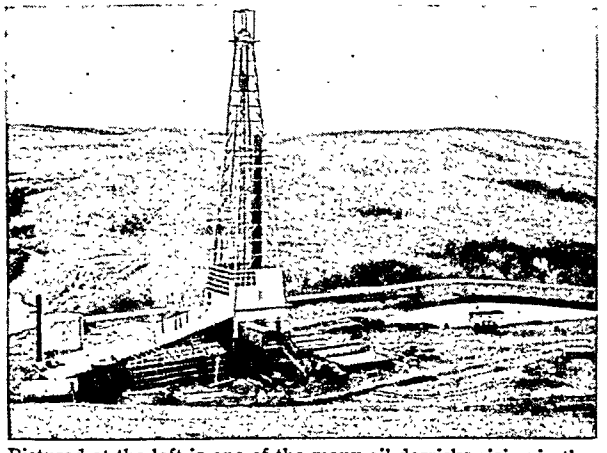
1797—Fur-trading North West Company sends Davi Thompson to map area. Charles Chaboillez estab lishes trading post at Pembina for the company.

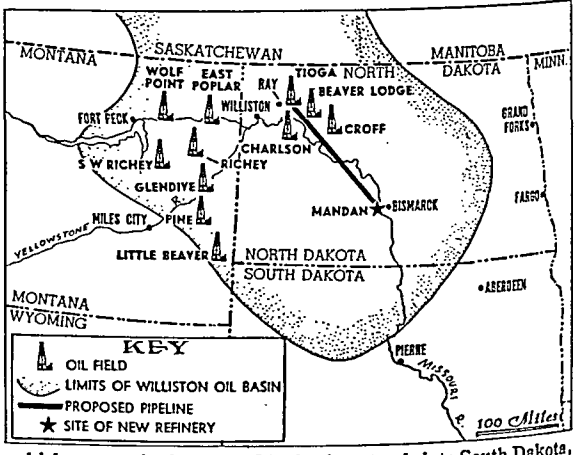
1800—Alexander Henry, Jr., builds North West Company post at Park River; moves it to Pembina, 1801.

1803—Louisiana Purchase gives U. S. possession of mos of what is now North Dakota.

1804—Lewis and Clark expedition spends winter with Indians near present Stanton; Indian woman, Sacagawea, agrees to guide them to Pacific Ocean; they build Fort Mandan.
1812—Settlers from Lord Selkirk's colony in Manitoba establish settlement at Pembina. Missouri Territory organized; includes most of North Dakota.
1818—Great Britain cedes eastern North Dakota to U. S. North Dakota-Canadian border fixed at 49° N. First school in region opened at Pembina.
1829—American Fur Company builds Fort Union at mouth of Yellowstone River; builds Fort Clark on Missouri, 1831.
1832—Steamboat *Yellowstone*, first up the Missouri River, reaches Fort Union.
1834—North Dakota east of Missouri and White Earth rivers becomes part of Michigan Territory; becomes part of Wisconsin Territory, 1836; Iowa Territory, 1838; Minnesota Territory, 1849.
1837—Smallpox epidemic reduces Mandan Indian tribe from 1,600 to 150 members.
1851—First flour mill in region built at Walhalla.
1853—Maj. I. I. Stevens surveys route for railroad.
1854—Western North Dakota included in Nebraska Territory.
1857—First U. S. military post in North Dakota, Fort Abercrombie, established on Red River.
1858—Minnesota becomes a state; most of North Dakota left without formal government for three years.
1861—Dakota Territory organized; extends from 43d to 49th parallels and from Minnesota and Iowa to main ridge of Rocky Mountains; Dr. William Jayne (President Lincoln's physician), governor.
1862—First Dakota legislature meets at Yankton (S. D.).
1863—Discovery of gold in Montana brings rush of prospectors through North Dakota. Gen. H. H. Sibley and Gen. A. Sully fight Indians in upper Missouri Valley; battle of Whitestone Hill (near Ellendale), September 3, is fiercest in North Dakota; upper valley opened for homesteading.
1864—Montana and Dakota territories separated.
1868—Joseph Rolette locates first homestead in northwestern Red River Valley. Dakota Territory reduced to present area of North and South Dakota. Sioux reservations established by Laramie Treaty.
1871—Telegraph links Fort Abercrombie with Winnipeg, Canada.
1873—Fort Abraham Lincoln built near Bismarck.
1876—Col. George Custer leaves Fort Abraham Lincoln to fight Indians on Little Bighorn River, Mont.
1878—In southwest North Dakota, Deffenbach brothers establish one of first cattle ranches in state.
1879—Northern Pacific Railway begins building west from Bismarck; line reaches West coast, 1883.
1880—Lignite mining begins in western North Dakota. Great Northern Railway begun across state; reaches West coast, 1893. Military reserves of forts Abercrombie and Seward opened to homesteading.
1883—Territorial capital moved from Yankton to Bismarck. University of North Dakota chartered at Grand Forks. Theodore Roosevelt becomes rancher near Medora; remains there until 1886.
1886—Bank of Hamilton, later first state bank, founded.
1887—Dakota residents vote to divide territory.
1889—Constitution for North Dakota approved, October 1; admitted to Union as 39th state, November 2; capital, Bismarck; governor, John Miller.
1907—Workmen's Compensation Act passed.
1909—Child Labor Act passed.
1915—Nonpartisan League organized; favors state-owned elevators, mills, etc., also government and tax reform; victorious in 1916, 1918, 1920 elections; it declined in power thereafter.
1920—Recall adopted by constitutional amendment.
1929—Long drought devastates state's farms; ends 1936.
1932—International Peace Garden dedicated.
1937—Water Conservation Commission established.
1946—Construction on Garrison Dam on Missouri River begins; to be largest rolled-earth dam in world.
1948—State law bans teachers in religious garb from public schools.
1949—Theodore Roosevelt National Memorial Park dedicated at Medora.
1951—Oil discovered in North Dakota south of Tioga.
1952—North Dakota ranks next to Utah in percentage of voters in national election (79.3%).
1953—South Dakotans raid grave of Sitting Bull to rebury him near his home. Garrison Dam dedicated by President Eisenhower; begin closing dam.

OIL IN THE WHEAT FIELDS OF NORTH DAKOTA



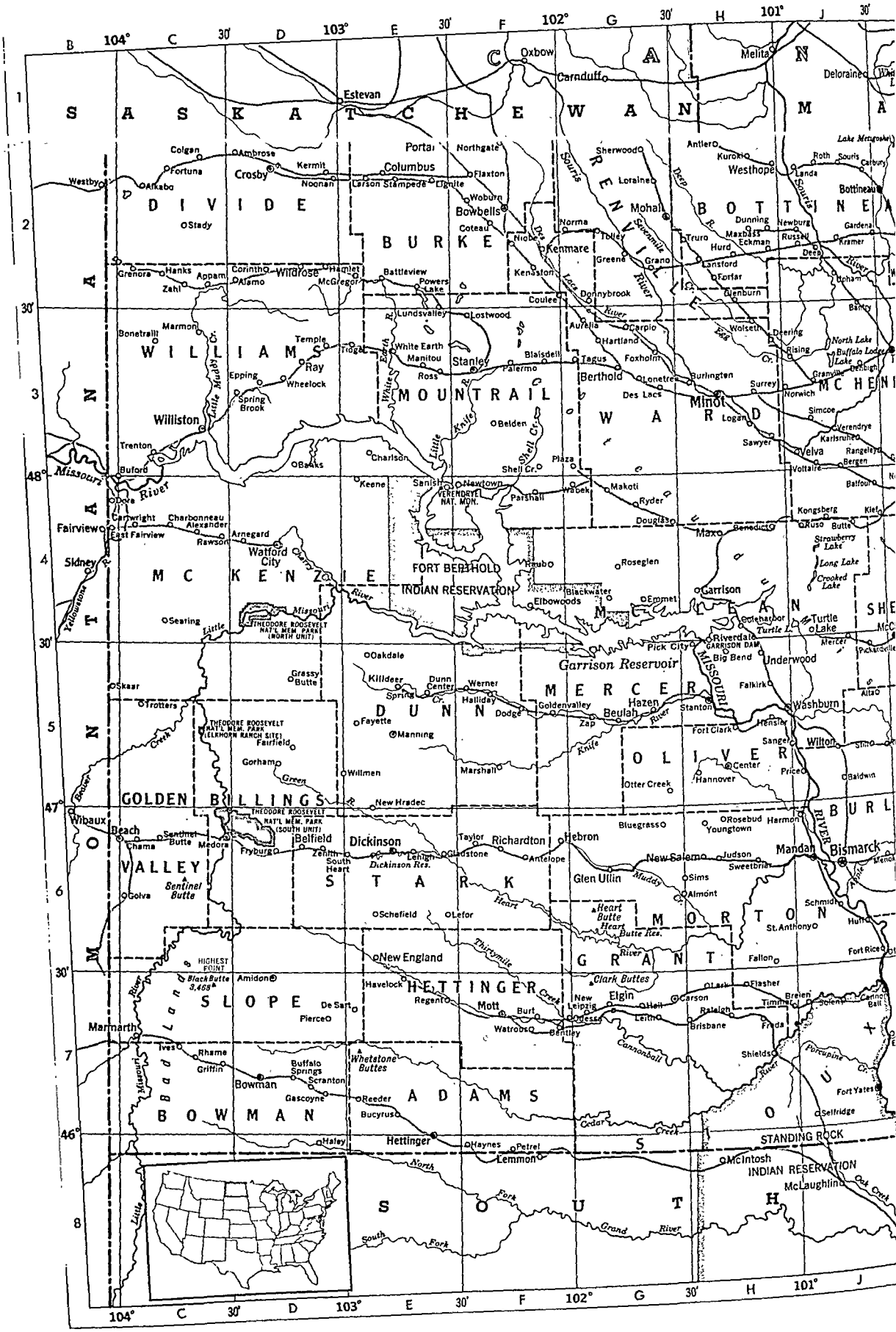


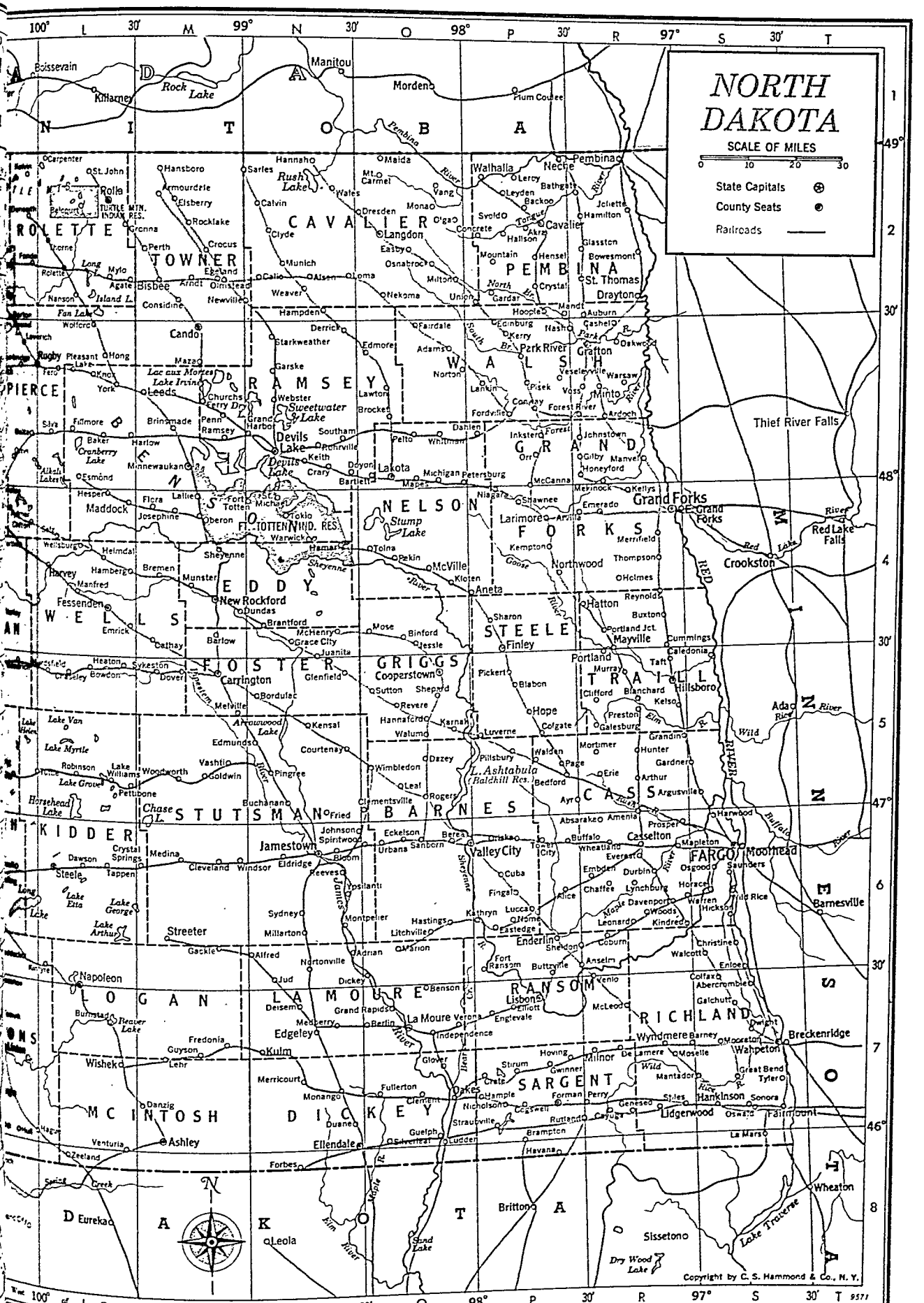
Pictured at the left is one of the many oil derricks rising in the rolling country of North Dakota since oil was discovered in 1951 near Williston. The map shows the Williston Oil Basin, which centers in the state. The basin extends into South Dakota, Montana, and Saskatchewan and Manitoba in Canada. It promises to become one of the nation's great oil fields.

NORTH DAKOTA

COUNTIES		
Adams	4,910	F 7
Barnes	16,884	O 5
Benson	10,675	M 3
Billings	1,777	D 5
Bottineau	12,140	J 2
Bowman	4,001	C 7
Burke	6,621	E 2
Burleigh	25,673	J 6
Cass	58,877	R 5
Cavalier	11,840	N 2
Dickey	9,121	N 7
Divide	5,967	C 2
Dunn	7,212	E 5
Eddy	5,372	N 4
Emmons	9,715	K 7
Foster	5,337	N 5
Golden Valley	3,499	C 5
Grand Forks	39,443	P 3
Grant	7,114	G 6
Griggs	5,460	O 5
Hettinger	7,100	E 7
Kidder	6,168	L 6
La Moure	9,498	N 7
Logan	6,357	L 7
McHenry	12,556	J 3
McIntosh	7,590	L 7
McKenzie	6,849	D 4
McLean	18,824	G 4
Mercer	8,686	G 5
Morton	19,295	H 6
Mountrail	9,418	E 3
Nelson	8,090	O 4
Oliver	3,091	H 5
Pembina	13,990	P 2
Pierce	8,326	K 3
Ramsey	14,373	N 3
Ransom	8,876	P 7
Renville	5,405	G 2
Richland	19,865	R 7
Rolette	11,102	L 2
Sargent	7,616	P 7
Sheridan	5,253	K 4
Sioux	3,696	H 7
Slope	2,315	C 7
Stark	16,137	E 6
Steele	5,145	P 4
Stutsman	24,158	M 5
Towner	6,360	M 2
Traill	11,359	R 5
Walsh	18,859	P 3
Ward	34,782	G 3
Wells	10,417	L 4
Williams	16,442	C 3

CITIES AND TOWNS		
Abercrombie	244	S 7
Absaraka	45	P 6
Adams	411	O 3
Adrian	55	O 6
Agate	14	L 2
Akra	25	P 2
Alamo	192	D 2
Alexander	302	C 4
Alfred	150	N 6
Alice	162	P 6
Alkabo	70	C 2
Almont	190	H 6
Alsen	114	N 2
Alta	6	J 5
Ambrose	286	D 2
Amenia	127	R 6
Amidon	82	D 7
Anamoose	542	K 4
Aneta	469	P 4
Anselm	22	R 6
Antelope	23	F 6
Antler	217	H 2
Appam	55	C 2
Ardoch	137	R 3
Arena	8	K 5
Argusville	126	R 5
Armourdale	7	M 2
Arndt	3	M 2
Arnegard	206	D 4
Arthur	380	R 5
Arvilla	115	P 4
Ashley	1,423	M 7
Auburn	39	R 2
Aurelia	18	G 3
Aylmer	35	K 4
Ayr	104	P 5
Backoo	46	P 2
Baker	42	L 3
Baldwin	70	J 5
Balfour	162	J 4
Balta	196	K 3
Banks	9	D 3
Bantry	125	J 3
Barlow	43	M 4
Barney	145	S 7
Bartlett	61	N 3
Barton	102	K 2
Bathgate	209	P 2
Battleview	60	E 2
Beach	1,461	C 6
Bedford	8	P 5
Belcourt	524	L 2
Belden	26	F 3
Belfield	1,051	D 6
Benedict	127	H 4
Benson	10	O 7
Bentley	66	F 7
Berea	6	O 6
Bergen	51	J 3
Berlin	124	O 7
Berthold	459	G 3
Berwick	71	K 3
Beulah	1,501	G 5
Big Bend	207	H 5
Binford	309	O 4
Bisbee	365	M 2
BISMARCK	18,640	J 6
Blabon	37	P 5
Blackwater	20	G 4
Blaisdell	80	F 3
Blanchard	60	R 5
Bloom	10	N 6
Bluegrass	7	G 6
Bonetraill	20	C 3
Bordulac	75	N 5
Bottineau	2,268	J 2
Bowbells	806	F 2
Bowdon	348	L 5
Bowesmont	150	R 2
Bowman	1,382	D 7
Braddock	175	K 6
Brampton	90	P 7
Brantford	78	N 4
Breien	30	H 7
Bremen	80	M 4
Brinsmade	136	M 3
Brisbane	24	H 7
Brocket	212	O 3
Buchanan	80	N 5
Bucyrus	111	E 7
Buffalo	261	R 6
Buffalo Springs	23	D 7
Buford	61	C 3
Burlington	240	H 3
Burnstad	68	L 7
Burt	65	F 7
Butte	272	J 4
Buttzville	18	P 6
Buxton	387	R 4
Caledonia	150	S 5
Calio	102	N 2
Calvin	152	N 2
Cando	1,530	M 3
Cannon Ball	200	J 7
Canton(Hensel)	139	P 2
Carbury	37	K 2
Carpenter	25	L 2
Carpio	194	G 3
Carrington	2,101	M 5
Carson	493	H 7
Cartwright	35	C 4
Cashel	20	R 3
Casselton	1,373	R 6
Cathay	209	M 4
Cavalier	1,459	P 2
Cayuga	178	R 7
Center	492	H 5
Chaffee	125	R 6
Chama		C 6
Charbonneau	22	C 4
Charlson	25	E 3
Chaseley	41	L 5
Christine	150	S 6
Churchs Ferry	223	M 3
Clement	4	O 7
Clementsville	23	O 5
Cleveland	181	M 6
Clifford	158	R 5
Clifton	7	K 4
Clyde	110	N 2
Coburn	3	R 6
Cogswell	393	P 7
Coleharbor	315	H 4
Colfax	116	S 7
Colgan	31	C 2
Colgate	72	P 5
Columbus	525	E 2
Concrete	54	P 2
Considine	5	M 2
Conway	107	P 3
Cooperstown	1,189	O 5
Corinth	30	D 2
Coteau	100	F 2
Coulee	75	F 2
Courtenay	229	N 5
Crary	235	N 3
Crete	50	P 7
Crocus	20	M 2
Crosby	1,689	D 2
Crystal	429	P 2
Crystal Springs	25	L 6
Cuba	7	P 6
Cummings	102	S 4
Dahlen	75	P 3
Danzig	23	M 7
Davenport	150	R 6
Dawson	280	L 6
Dazey	196	O 5
De Lamere	120	R 7
De Sart	6	D 7
Deep		J 2
Deering	136	J 3
Deisem	20	N 7
Denbigh	27	J 3
Denhoff	170	K 5
Derrick	12	N 3
Des Lacs	180	G 3
Devils Lake	6,427	N 3
Dickey	165	N 6
Dickinson	7,469	E 6
Dodge	251	F 5
Donnybrook	207	G 2
Dore	25	C 4
Douglas	236	G 4
Dover	4	M 5
Doyon	98	O 3
Drake	831	K 4
Drayton	875	R 2
Dresden	165	O 2
Driscoll	225	K 6
Duane		N 7
Dundas		N 4
Dunn Center	246	E 5
Dunning	4	H 2
Dunseith	713	K 2
Durbin	34	R 6
Dwight	129	S 7
Easby	12	O 2
East Fairview	202	C 4
Eastedge	14	P 6
Eckelson	175	O 6
Eckman	55	H 2
Edgeley	943	N 7
Edinburg	343	P 3
Edmore	458	O 3
Edmunds	60	M 5
Egeland	248	M 2
Elbowoods	215	F 4
Eldridge	62	N 6
Elgin	882	G 7
Ellendale	1,759	N 7
Elliott	87	P 7
Elsberry	2	M 2
Embden	64	R 6
Emerado	125	R 4
Emmet	7	G 4
Emmonsburg	5	K 7
Emrick	20	L 4
Enderlin	1,504	P 6
Englevale	100	P 7
Enloe	2	S 6
Epping	158	D 3
Erie	148	R 5
Esmond	475	L 3
Everest	14	R 6
Fairdale	131	O 3
Fairfield	6	D 5
Fairmount	660	S 7
Falkirk	46	H 5
Fallon	3	H 6
Fargo	38,256	S 6
Fayette	7	E 5
Fero	4	L 3
Fessenden	917	L 4
Fillmore	75	L 3
Fingal	210	P 6
Finley	671	P 4
Flasher	413	H 7
Flaxton	436	F 2
Flora	35	M 4
Fonda	16	K 2
Forbes	204	N 8
Fordville	376	P 3
Forest River	236	P 3
Forfar	4	H 2
Forman	466	P 7
Fort Clark	30	H 5
Fort Ransom	200	P 6
Fort Rice	27	J 6
Fort Totten	250	M 4
Fort Yates	825	J 7
Fortuna	181	C 2
Foxholm	180	G 3
Freda	8	H 7
Fredonia	268	M 7
Fried	26	N 5
Fryburg	100	D 6
Fullerton	206	O 7
Funston	10	K 4
Gackle	604	M 6
Galchutt	73	S 7
Galesburg	169	R 5
Gardar	81	P 2
Gardena	116	J 2
Gardner	136	R 5
Garrison	1,890	H 4
Garske	18	N 3
Gascoyne	76	D 7
Geneseo	135	R 7
Gilby	350	R 3
Gladstone	224	F 6
Glasston	54	R 2
Glen Ullin	1,324	G 6
Glenburn	281	H 2
Glenfield	165	N 5
Glover	50	O 7
Goldenvalley	339	F 5
Goldwin	17	M 5
Golva	174	C 6
Goodrich	448	K 5
Gorham	35	D 5
Grace City	89	N 4
Grafton	4,901	R 3
Grand Forks	26,836	R 4
Grand Harbor	8	N 3
Grand Rapids	45	N 7
Grandin	156	R 5
Grano	27	G 2
Granville	404	J 3
Grassy Butte	75	D 5
Great Bend	169	S 7
Greene	20	G 2
Grenora	525	C 2
Griffin		C 7
Gronna		L 2
Guelph	61	O 7
Guthrie	31	K 3
Guyson	12	M 7
Gwinner	197	P 7
Hague	328	L 7
Haley	9	D 8
Halliday	477	F 5
Hallson	3	P 2
Hamar	79	N 4
Hamberg	124	L 4
Hamilton	241	R 2
Hamlet	20	E 2
Hampden	203	N 2
Hample	24	P 7
Hankinson	1,409	S 7
Hanks	115	C 2
Hannaford	313	O 5
Hannah	257	N 2
Hannover	33	H 5
Hansboro	134	M 2
Harlow	95	M 3
Harmon	25	H 6
Hartland		G 3
Harvey	2,337	L 4
Harwood	126	S 6
Hastings	100	O 6
Hatton	991	R 4
Havana	267	P 8
Havelock	22	E 7
Haynes	145	F 8
Hazelton	453	K 7
Hazen	1,230	G 5
Heaton	100	L 5
Hebron	1,412	G 6
Heil	100	G 7
Heimdal	120	L 4
Hensel	139	P 2
Hensler	43	H 5
Hesper	20	L 4
Hettinger	1,762	E 8
Hickson	50	S 6
Hillsboro	1,331	S 5
Holmes	10	R 4
Honeyford	50	R 3


SASKATCHEWAN
NORTH DAKOTA
DIVIDE
BURKE
RENVILLE
BOTTINEAU
WILLIAMS
MOUNTRAIL
WARD
MCHENRY
MCKENZIE
FORT BERTHOLD INDIAN RESERVATION
MCLEAN
SHERIDAN
GOLDEN VALLEY
BILLINGS
DUNN
MERCER
OLIVER
BURLEIGH
MORTON
GRANT
SLOPE
HETTINGER
ADAMS
BOWMAN
SOUTH
STANDING ROCK INDIAN RESERVATION
Garrison Reservoir
Missouri River
Little Missouri River
Knife River
Heart River
Cannonball River
Grand River
North Fork
South Fork
Oxbow
Carnduff
Estevan
Melita
Deloraine
Colgan
Ambrose
Fortuna
Crosby
Kermit
Columbus
Portal
Northgate
Flaxton
Westby
Alkabo
Noonan
Larson
Stampede
Lignite
Woburn
Bowbells
Sherwood
Antler
Kurtz
Westhope
Roth
Souris
Landa
Carbury
Lake Metigoshe
Lorraine
Mohall
Norma
Niobe
Coteau
Kenmare
Tolley
Truro
Maxbass
Dunning
Newburg
Bottineau
Gardena
Russell
Eckman
Hurd
Kramer
Deep River
Lansford
Forfar
Glenburn
Donnybrook
Coulee
Kenaston
Greene
Grano
Stady
Grenora
Hanks
Appam
Zahl
Corinth
Alamo
Wildrose
McGregor
Hamlet
Battleview
Powers Lake
Lundsvalley
Lostwood
Aurelia
Carpio
Hartland
Wolseth
Deering
Rising
North Lake
Buffalo Lodge Lake
Denbigh
Granville
Bonetrail
Marmon
Temple
Tioga
White Earth
Manitou
Stanley
Blaisdell
Tagus
Foxholm
Berthold
Lonetree
Burlington
Surrey
Norwich
Minot
Logan
Simcoe
Verendrye
Karlsruhe
Velva
Rangeley
Bergen
Voltaire
Batfour
Sawyer
Epping
Ray
Wheelock
Spring Brook
Williston
Trenton
Buford
Missouri River
Dore River
Carwright
Charbonneau
Alexander
Fairview
East Fairview
Rawson
Arnegard
Watford City
Sidney
Yellowstone
Seating
Theodore Roosevelt Nat'l Mem. Park (North Unit)
Belden
Charlson
Banks
Shell Cr.
Plaza
Keene
Sanish
Newtown
Verendrye Nat. Mon.
Parshall
Wabek
Makoti
Ryder
Douglas
Kongsberg
Kiel
Maxo
Benedict
Uso
Butte
Strawberry Lake
Long Lake
Crooked Lake
Roseglen
Raub
Blackwater
Elbowoods
Emmet
Garrison
Cedarharbor
Turtle Lake
Mercer
Pick City
Riverdale
Garrison Dam
Big Bend
Underwood
Pick City
Oakdale
Killdeer
Dunn Center
Werner
Halliday
Dodge
Goldenvalley
Hazen
Falkirk
Washburn
Alta
Grassy Butte
Skaar
Trotters
Fayette
Manning
Zap
Beulah
Stanton
Fort Clark
Hensler
Sanger
Wilton
Almo
Center
Price
Baldwin
Hannover
Otter Creek
Marshall
Willmen
Gorham
Fairfield
Theodore Roosevelt Nat'l Mem. Park (Elkhorn Ranch Site)
Theodore Roosevelt Nat'l Mem. Park (South Unit)
New Hradec
Wibaux
Beach
Sentinel Butte
Medora
Chama
Belfield
Fryburg
Zenith
South Heart
Dickinson
Dickinson Res.
Lehigh
Gladstone
Taylor
Richardton
Antelope
Hebron
Bluegrass
Rosebud
Harmon
Youngtown
New Salem
Judson
Sweetbriar
Mandan
Bismarck
Menoken
Glen Ullin
Muddy Cr.
Sims
Almont
Golva
Schefield
Lefor
Heart Butte
Heart Butte Res.
Schmidt
Hutto
St. Anthony
New England
Thirtymile Cr.
Fallon
Fort Rice
Havelock
Regent
Mott
Burt
New Leipzig
Elgin
Carson
Lark
Flasher
Breien
Carnoc
Ball
Solen
Timmer
Leith
Odessa
Watrous
Bentley
Brisbane
Raleigh
Fryda
Marmarth
Ives
Rhame
Griffin
Buffalo Springs
Scranton
Bowman
Gascoyne
Reeder
Bucyrus
Whetstone Buttes
Shields
Porcupine
Fort Yates
Selfridge
Cedar Creek
Haley
Hettinger
Haynes
Petrel
Lemmon
McIntosh
McLaughlin
Oak Creek
Black Butte 3,468
Highest Point
Clark Buttes
Cannonball
Little Missouri
Bad Lands


NORTH DAKOTA
SCALE OF MILES
0 10 20 30
State Capitals
County Seats
Railroads
100° L 30' M 99° N 30' O 98° P 30' R 97° S 30' T
49°
48°
47°
46°
Boissevain
Manitou
Morden
Rock Lake
Killarney
Plum Coulee
Pembina
Carpenter
St. John
Rolla
Belcourt
TURTLE MTN. INDIAN RES.
Hansboro
Sarles
Hannah
Malda
Rush Lake
Mt. Carmel
Wales
Walhalla
Lercy
Leyden
Bathgate
Necke
Pembina
ROLETTE
Armourdale
Elsberry
Rocklake
Calvin
Dresden
Mona
Vang
Svold
Olga
Concrete
Cavalier
Hamilton
Jelliette
Backoo
CAVALIER
Langdon
Easby
Mountain
Hensel
Bowesmont
Glasston
Gronna
Perth
Crocus
TOWNER
Munich
Osnabrock
Milton
Crystal
St. Thomas
PEMBINA
Rolette
Long
Mylo
Egeland
Calio
Alsen
Loma
Nekoma
Union
Gardar
Drayton
Agate
Bisbee
Arndt
Olmstead
Weaver
Nanson
Island L.
Newville
Considine
Hampden
Hoople
Mandt
Auburn
Fan Lake
Wolford
Derrick
Fairdale
Edinburg
Kerry
Nash
Gashel
Cando
Starkweather
Edmore
Adams
Park River
Grafton
Oakwood
Rugby
Pleasant
Hong
Mazo
Lake
Norton
Veseleyville
Warsaw
Knox
Lac aux Mortes
Lake Irving
Leeds
Churchs Ferry
Webster
Garske
Lawton
Lankin
Pisek
Voss
Minto
PIERCE
York
RAMSEY
Sweetwater Lake
Conway
Forest River
Ardoch
Thief River Falls
Silva
Fillmore
Brinsmade
Penn
Ramsey
Grand Harbor
Devils Lake
Southam
Dahlen
Pelto
Whitman
Inkster
Johnstown
Baker
Harlow
Cranberry Lake
Minnewaukan
Crary
Keith
Rohrville
Bartlett
Lakota
Michigan
Petersburg
Orr
Gilby
Manvel
Honeyford
GRAND FORKS
Esmond
Hespero
Flora
Lallie
Maddock
Josephine
Oberon
Fort Totten
St. Michael
Tokio
FT. TOTTEN IND. RES.
Warwick
Niagara
Shawnee
McCanna
Melrose
Kellys
Grand Forks
Emerado
Grand Forks
Red Lake Falls
NELSON
Stump Lake
Larimore
Arville
FORKS
Merrifield
Kempton
Northwood
Thompson
Holmes
Crookston
Red Lake
Red River
Wellsburg
Helmdal
Sheyenne
Hamar
Tolna
Pekin
McVille
Kloten
Goose River
Harvey
Hamberg
Bremen
Munster
Manfred
EDDY
Aneta
Fessenden
New Rockford
Dundas
Brantford
McHenry
Grace City
Juanita
Mose
Binford
Jessie
Sharon
Finley
Hatton
Reynold
Buxton
Portland Jct.
Mayville
Cummings
Caledonia
WELLS
STEELE
Emrick
Cathay
Barlow
Portland
Murray
Taft
Heaton
Sykeston
Dover
Bowdon
Crystal Springs
FOSTER
Carrington
Glenfield
GRIGGS
Cooperstown
Sutton
Shepard
Revere
Pickert
Blabon
Clifford
Blanchard
Kelso
TRAILL
Hillsboro
Arrowwood Lake
Melville
Bordulac
Hannaford
Karnak
Hope
Preston
Galesburg
Colgate
Luverne
Lake Van
Lake Myrtle
Edmunds
Kensal
Courtenay
Walum
Grandin
Wild Rice River
Robinson
Lake Williams
Woodworth
Vashti
Goldwin
Pingree
Wimbledon
Dazey
Pillsbury
Walden
Mortimer
Hunter
Page
Gardner
Lake Grove
Pettibone
Leal
Rogers
L. Ashtabula
Baldhill Res.
Bedford
Erie
Arthur
CASS
Argusville
Horsehead Lake
Chase L.
STUTSMAN
Buchanan
Fried
BARNES
Clementsville
Ayr
Absaraka
Amenia
Prosper
Harwood
Buffalo River
KIDDER
Johnson
Eckelson
Berea
Driskal
Buffalo
Casselton
Jamestown
Spiritwood
Urbana
Sanborn
Valley City
Tower City
Wheatland
Everest
Mapleton
FARGO
Moorhead
Dawson
Steele
Tappen
Medina
Cleveland
Windsor
Eldridge
Reeves
Bloom
Sheyenne River
Embden
Durbin
Osgood
Saunders
Ypsilanti
Cuba
Fingal
Chaffee
Lynchburg
Horace
Lake Eita
Lake George
Lake Arthur
James River
Sydney
Montpelier
Hastings
Litchville
Alice
Davenport
Warren
Hickson
Wild Rice
Barnesville
Streeter
Millarton
Kathryn
Lucca
Nome
Eastedge
Leonard
Woods
Kindred
Gackle
Alfred
Adrian
Marion
Enderlin
Sheldon
Coburn
Christine
Walcott
Napoleon
Nortonville
Jud
Dickey
Fort Ransom
Buttzville
Anselm
Enloe
LOGAN
LAMOURE
Benson
RANSOM
Venlo
Colfax
Abercrombie
Burnstad
Beaver Lake
Deisem
Grand Rapids
Lisbon
Elliott
Gaichutt
RICHLAND
Edgeley
Medberry
Berlin
La Moure
Verona
Englevale
McLeod
Wyndmere
Barney
Mooreton
Wright
Breckenridge
Fredonia
Guyson
Kulm
Independence
Wishek
Lehr
Glover
Hoving
Stirum
Milnor
De Lamere
Moselle
Wahpeton
Great Bend
Tyler
Merricourt
Fullerton
Dykes
Crete
Gwinner
SARGENT
Mantador
Hankinson
Sonora
Monango
Clement
Nicholson
Forman
Perry
Geneseo
Sides
Ridgewood
Oswald
Fairmount
MCINTOSH
DICKEY
Danzig
Duane
Straubville
Rutland
Cayuga
Ashley
Venturia
Zeeland
Ellendale
Guelph
Silverleaf
Ludden
Brampton
Havana
La Mars
Forbes
Spring Creek
Maple River
Sand Lake
Eureka
Leola
Britton
Sissetono
Dry Wood Lake
Lake Traverne
Wheaton
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NORTH DAKOTA—*Continued*

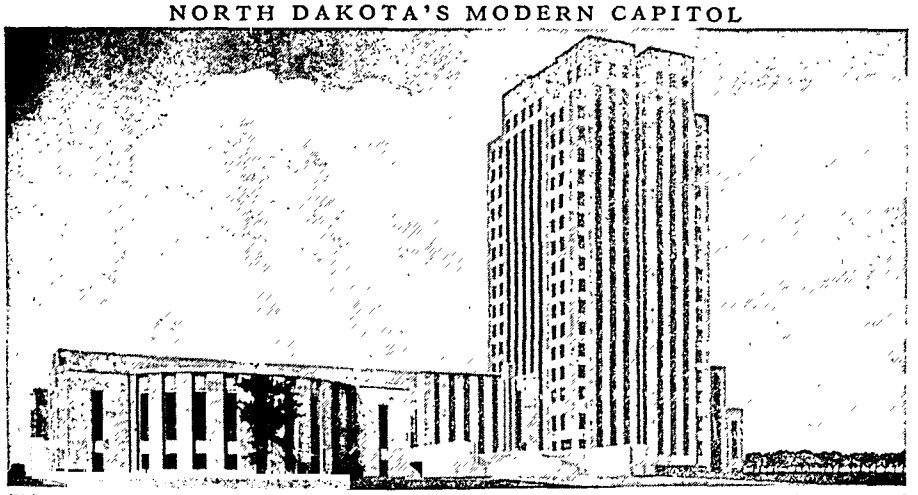
Hong	4	L 3
Hoople	447	P 2
Hope	470	P 5
Horace	190	S 6
Hoving	5	P 7
Huff	52	J 6
Hull	50	K 7
Hunter	417	R 5
Hurd	2	H 2
Hurdsfield	223	L 5
Independence	30	O 7
Inkster	304	P 3
Ives		C 7
Jamestown	10,697	N 6
Jessie	83	O 4
Johnson		N 6
Johnstown	50	R 3
Joliette	66	R 2
Josephine	8	M 4
Juanita	98	N 4
Jud	175	N 6
Judson	75	H 6
Karlsruhe	282	J 3
Karnak	18	O 5
Kathryn	200	P 6
Keene	17	E 4
Keith	4	N 3
Kellys	9	R 4
Kelso	26	R 5
Kelvin	10	K 2
Kempton	55	P 4
Kenaston	50	F 2
Kenmare	1,712	G 2
Kensal	376	N 5
Kermit	25	D 2
Kerry		P 3
Kief	135	J 4
Killdeer	698	E 5
Kindred	504	R 6
Kintyre	102	L 6
Kloten	120	O 4
Knox	190	L 3
Kongsberg	14	J 4
Kramer	198	J 2
Kulm	707	N 7
Kuroki	20	H 2
La Mars	5	S 8
La Moure	1,010	O 7
Lake Williams	50	L 5
Lakota	1,032	O 3
Lallie	5	M 4
Landa	132	J 2
Langdon	1,838	O 2
Lankin	287	P 3
Lansford	352	H 2
Larimore	1,374	P 4
Lark	9	H 7
Larson	59	E 2
Lawton	211	O 3
Leal	72	O 5
Leeds	778	M 3
Lefor	150	F 6
Lehigh	38	E 6
Lehr	394	M 7
Leith	160	G 7
Leonard	325	R 6
Leroy	70	P 2
Leverich	4	L 3
Leyden	15	P 2
Lidgerwood	1,147	R 7
Lignite	230	F 2
Lincoln Valley	79	K 4
Linton	1,675	K 7
Lisbon	2,031	P 7
Litchville	408	O 6
Livona	6	K 6
Logan		H 3
Loma	53	O 2
Lonetree	24	G 3
Loraine	70	G 2
Lostwood	30	F 3
Lucca	37	P 6
Ludden	96	O 7
Lundsvalley	11	E 3
Luverne	154	P 5
Lynchburg	27	R 6
Maddock	741	L 4
Maida	35	O 2
Makoti	219	G 4
Mandan	7,298	J 6
Mandt	20	R 2
Manfred	74	L 4
Manitou	13	E 3
Manning	85	E 5
Mantador	138	R 7
Manvel	278	R 3
Mapes	30	O 3
Mapleton	169	S 6
Marion	272	O 6
Marmarth	469	B 7
Marmon	9	C 3
Marshall	12	F 5
Martin	171	K 4
Max	465	H 4
Maxbass	259	H 2
Mayville	1,790	R 4
Maza	82	M 3
McCanna	41	P 3
McClusky	850	K 4
McGregor	120	D 2
McHenry	189	N 4
McKenzie	81	K 6
McLeod	125	R 7
McVille	626	O 4
Medberry	5	N 7
Medina	564	M 6
Medora	180	C 6
Mekinock	100	R 4
Melville	60	M 5
Menoken	45	J 6
Mercer	214	J 5
Merricourt	105	N 7
Merrifield	27	R 4
Michigan	486	O 3
Millarton	31	N 6
Milnor	674	R 7
Milton	322	O 2
Minnewaukan	443	M 3
Minot	22,032	H 3
Minto	592	R 3
Moffit	178	K 6
Mohall	1,073	G 2
Mona	10	O 2
Monango	138	N 7
Montpelier	105	O 6
Mooreton	161	S 7
Mortimer	8	R 5
Mose	20	O 4
Moselle	13	R 7
Mott	1,583	F 7
Mount Carmel	40	O 2
Mountain	219	P 2
Munich	248	N 2
Munster	4	M 4
Murray	3	R 5
Mylo	110	L 2
Nanson	18	L 2
Napoleon	1,070	L 6
Nash	43	P 3
Neche	615	P 2
Nekoma	140	O 2
New England	1,117	E 6
New Hradec	64	E 5
New Leipzig	447	G 7
New Rockford	2,185	N 4
New Salem	942	G 6
Newburg	105	J 2
Newtown		F 4
Newville	20	M 2
Niagara	163	P 4
Nicholson	3	P 7
Niobe	78	F 2
Nome	217	P 6
Noonan	551	D 2
Norfolk	2	K 4
Norma	100	G 2
Northgate	85	F 2
Northwood	1,182	R 4
Norton	3	O 3
Nortonville	112	N 6
Norwich	70	J 3
Oakdale	6	E 5
Oakes	1,774	O 7
Oakwood	66	R 3
Oberon	238	M 4
Odessa		G 7
Olga	145	O 2
Olmstead	24	M 2
Omemee	60	K 2
Oriska	135	P 6
Orr	67	P 3
Orrin	179	K 3
Osgood	2	S 6
Osnabrock	284	O 2
Oswald	2	S 7
Otter Creek		G 5
Overly	90	K 2
Page	482	P 5
Palermo	150	F 3
Park River	1,692	P 3
Parshall	935	F 4
Pekin	221	O 4
Pelto	21	O 3
Pembina	640	R 2
Penn	67	M 3
Perry		R 7
Perth	124	M 2
Petersburg	318	P 3
Pettibone	187	L 5
Pick City	294	G 5
Pickardville	25	J 5
Pickert	20	P 5
Pierce	5	D 7
Pillsbury	119	P 5
Pingree	161	N 5
Pisek	215	P 3
Plaza	389	G 3
Pleasant Lake	45	L 3
Portal	409	E 2
Portland	641	R 5
Portland Jct.	2	R 4
Powers Lake	565	E 2
Preston	4	R 5
Price	7	H 5
Prosper	37	R 6
Raleigh	125	H 7
Ramsey	12	M 3
Rangeley	3	J 3
Raub	50	F 4
Rawson	32	C 4
Ray	721	D 3
Reeder	339	E 7
Reeves		N 6
Regan	129	K 5
Regent	405	E 7
Revere	22	O 5
Reynolds	335	R 4
Rhame	340	C 7
Richardton	721	F 6
Rising	3	J 3
Riverdale	2,551	H 5
Robinson	166	L 5
Rocklake	385	M 2
Rogers	150	O 5
Rohrville	10	N 3
Rolette	451	L 2
Rolla	1,176	L 2
Rosebud		H 6
Roseglen	40	G 4
Ross	85	E 3
Roth	29	J 2
Rugby	2,907	L 3
Ruso	37	J 4
Russell	51	J 2
Rutland	309	P 7
Ryder	330	G 4
Saint Anthony	75	H 6
Saint John	451	L 2
Saint Michael	56	N 4
Saint Thomas	566	R 2
Sanborn	324	O 6
Sanger	24	H 5
Sanish		E 4
Sarles	285	N 2
Saunders		S 6
Sawyer	264	H 3
Schefield	20	E 6
Schmidt	2	J 6
Scranton	360	D 7
Searing	5	C 4
Selfridge	343	J 7
Selz	200	L 4
Sentinel Butte	229	C 6
Sharon	312	P 4
Shawnee		P 4
Sheldon	267	P 6
Shell Creek	40	F 3
Shepard	3	O 5
Sherwood	421	G 2
Sheyenne	469	M 4
Shields	124	H 7
Silva	40	L 3
Silverleaf	7	O 7
Simcoe	24	J 3
Sims	11	H 6
Skaar	2	C 5
Solen	300	J 7
Sonora	15	S 7
Souris	206	J 2
South Heart	100	E 6
South West Fargo	1,032	*S 6
Southam	85	N 3
Spiritwood	105	N 6
Spring Brook	51	D 3
Stady	7	C 2
Stampede		E 2
Stanley	1,486	F 3
Stanton	571	H 5
Starkweather	229	N 3
Steele	762	L 6
Sterling	88	K 6
Stiles	8	R 7
Still	3	J 5
Stirum	85	P 7
Strasburg	733	K 7
Straubville	22	O 7
Streeter	602	M 6
Surrey	175	H 3
Sutton	125	O 5
Svold	5	P 2
Sweetbriar	5	H 6
Sydney	22	N 6
Sykeston	272	M 5
Taft		R 5
Tagus	101	G 3
Tappen	379	L 6
Taylor	258	F 6
Temple	20	D 3
Temvik	71	K 7
Thompson	270	R 4
Thorne	37	L 2
Timmer	6	H 7
Tioga	456	E 3
Tokio	100	N 4
Tolley	248	G 2
Tolna	281	O 4
Tower City	292	P 6
Towner	955	K 3
Trenton	150	C 3
Trotters	2	C 5
Truro		H 2
Tunbridge	12	K 3
Turtle Lake	839	J 4
Tuttle	368	L 5
Tyler	18	S 7
Underwood	1,061	H 5
Union	23	O 2
Upham	403	J 2
Urbana	12	O 6
Valley City	6,851	P 6
Vang	10	O 2
Vashti	15	M 5
Velva	1,170	J 3
Venlo	50	R 7
Venturia	190	L 7
Verendrye	35	J 3
Verona	189	O 7
Veseleyville	65	R 3
Voltaire	72	J 3
Voss	60	R 3
Wabek	15	G 4
Wahpeton	5,125	S 7
Walcott	296	R 6
Walden	8	P 5
Wales	235	N 2
Walhalla	1,463	P 2
Walum	52	O 5
Warren	10	S 6
Warsaw	89	R 3
Warwick	155	N 4
Washburn	913	J 5
Watford City	1,371	D 4
Watrous		F 7
Weaver	12	N 2
Webster	96	N 3
Wellsburg	42	L 4
Werner	63	F 5
West Fargo	159	*S 6
Westfield	52	K 7
Westhope	575	H 2
Wheatland	134	R 6
Wheelock	101	D 3
White Earth	218	E 3
Whitman	90	O 3
Wild Rice	42	S 6
Wildrose	430	D 2
Williston	7,378	C 3
Willmen	20	E 5
Willow City	595	K 2
Wilton	796	J 5
Wimbledon	449	O 5
Windsor	100	N 6
Wing	312	K 5
Wishek	1,241	L 7
Woburn	17	F 2
Wolford	140	L 3
Wolseth	16	H 3
Woods	3	R 6
Woodworth	207	M 5
Wyndmere	627	R 7
York	220	L 3
Youngtown	8	H 6
Ypsilanti	120	O 6
Zahl	105	C 2
Zap	425	G 5
Zeeland	484	L 8
Zenith		D 6

*No room on map for name.

North Dakota's greatest crop is wheat (*see* Wheat). It produces more of this grain than any other state except Kansas. In recent times North Dakota's wheat crop—both winter and spring varieties—has averaged about 140 million bushels a year. In spring wheat, North Dakota leads the nation. This type of wheat is best adapted to the state's climate and soil.

Among all the states, North Dakota produces the most barley. It also ranks high in the production of oats, rye, and flaxseed. Cattle, milk, hogs, corn, hay, and potatoes are other products that yield a large part of the state's farm income.

NORTH DAKOTA'S MODERN CAPITOL



This handsome State Capitol is at Bismarck. The 19-story skyscraper tower at the east end houses the state office building. The chambers of the Senate and the House of Representatives occupy the unit at the west end of the building.

There was a time when great cattle and sheep ranches covered a large part of the state. Now most of these have been divided into farms. Yet the abundance of natural grasses, alfalfa, and other feeds have enabled North Dakota to continue as an important stock-raising and dairying state.

Manufacturing and Cities

Only about one-fourth of the people of North Dakota live in towns and cities. Many of them are engaged in wholesale and retail trade and in factories that process food products. The most valuable food products manufactured in the state are creamery butter, flour and feed, meat, and bakery products.

Fargo, on the Red River, is the largest city in the state. It is also the principal distributing point for farm products. One of its largest industries is printing and publishing. Fargo is also noted for its meat-packing plants and dairies. Grand Forks, also on the Red River, is one of the largest grain terminals between Spokane and Minneapolis. It is a railroad division point. Minot, on the Souris River, is the main center of trade for the north central part of the state. Bismarck, the capital, on the Missouri River, is a shipping point for the south central section of the state (*see* Bismarck).

The Government and People

The state constitution allows the initiative, referendum, and recall. The governor may not veto any legislation initiated by or referred to the voters.

Resentment at practices in the grain trade led the farmers in 1915 to organize the Nonpartisan League. The league was successful in gaining control of the state government. Then the legislature passed an amendment to the state constitution which permitted the state to engage in any kind of business in the interest of its residents.

Under this amendment, the state legislature established state-owned terminal elevators and flour mills, a state bank, a system of rural credits, hail insurance, and assistance to coöperative stores. The legislature exempted from taxation all improvements on farm land, and taxed heavily all unused lands to force them into productive use. This economic program is among the most far-reaching adopted by any American state. North Dakota also has a mother's pension law and very exacting pure food and drug acts.

A large number of North Dakota's residents are foreign born or of foreign parentage. Norwegians, Russians, Germans, Canadians, Swedes, and Danes predominate. Settlements of Finns and Icelanders were drawn there by the northern latitude.

Schools and Colleges

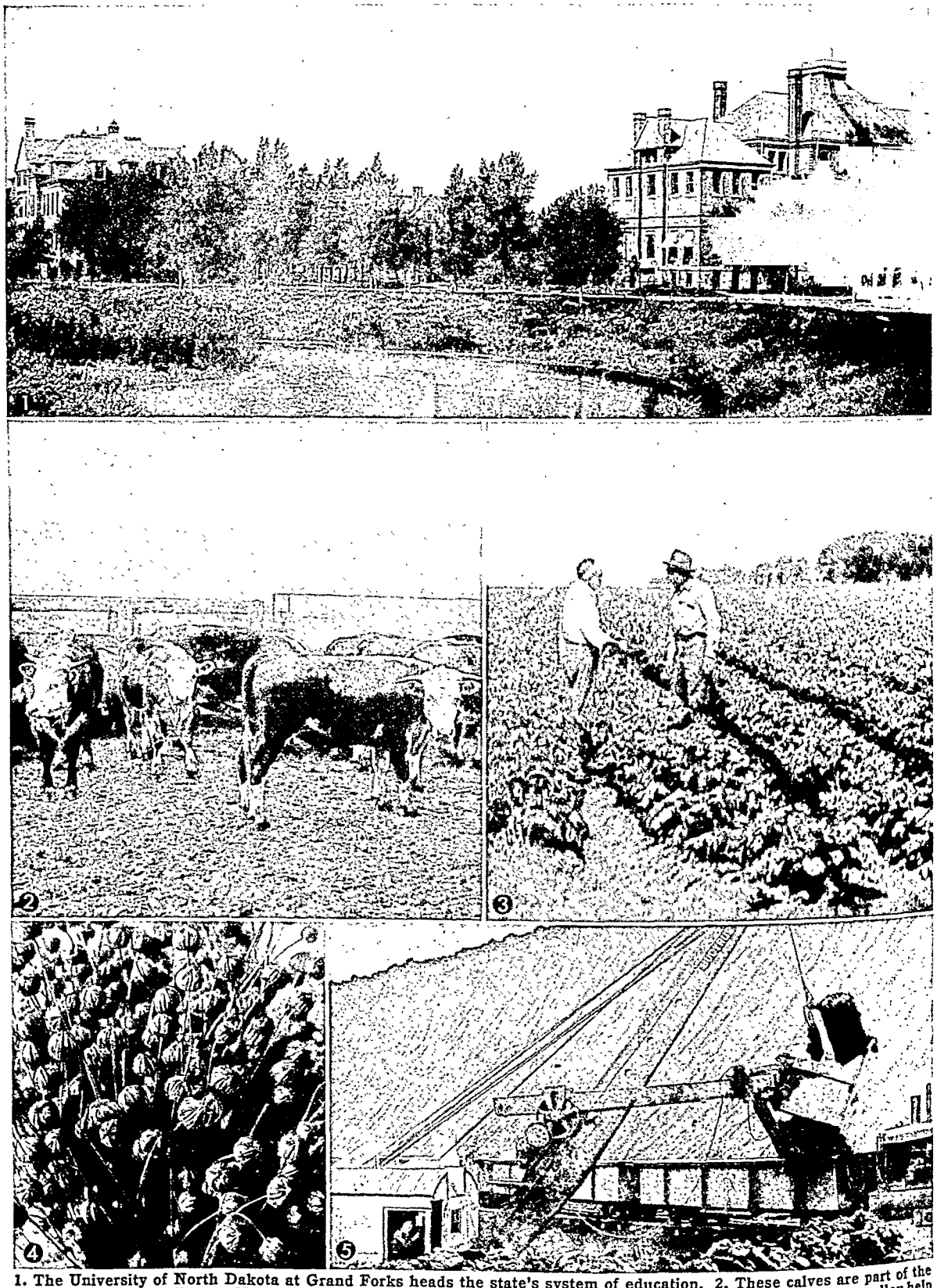
Because North Dakota is so largely a rural state, the people have taken great pride in making their rural schools efficient. In most parts of the state the rural schools provide free bus transportation to pupils. They have educational advantages that are equal to those enjoyed by children in the towns and cities of the state. As a result of rural and urban educational opportunities, the state has a very low percentage of illiteracy.

Among the institutions of higher education in North Dakota are 13 colleges and universities, including two junior colleges. The state-supported schools are the University of North Dakota at Grand Forks; the State Agricultural College at State College near Fargo; the State School of Science at Wahpeton; and the State School of Forestry at Bottineau. There are state teachers colleges at Valley City, Mayville, Minot, Ellendale, and Dickinson. Jamestown College at Jamestown and Wesley College at Grand Forks are private institutions. The state also has three special schools for handicapped persons.

The State's History

What is now the state of North Dakota was for centuries the home of many different Indian tribes. Some of these tribes engaged in farming long before the coming of white settlers. They included the Mandan, Hidatsa, and Arikara tribes, who carried on agriculture in the Missouri River valley. The Wandering Dakotas, or Sioux, the Chippewas, and the

NORTH DAKOTA—A LAND OF PRAIRIE WEALTH

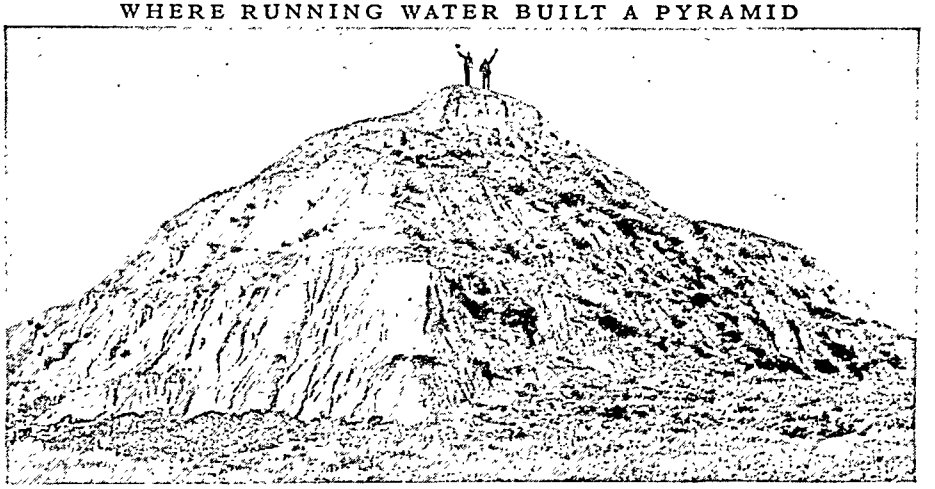


1. The University of North Dakota at Grand Forks heads the state's system of education. 2. These calves are part of the large herds that contribute to North Dakota's agricultural wealth. 3. Potato farms such as this one in the Red River valley help put the "Flickertail State" among the leading potato-producing states. 4. North Dakota and Minnesota together raise more than three fifths of the nation's flaxseed. 5. Lignite coal is the most valuable mineral. Here it is mined at an open pit at Velva.

Assiniboines, however, raised only a few small crops. They spent their time chiefly in hunting.

Valuable furs collected by Indian hunters brought the first white men to the Dakotas. Canadian and American fur companies contested bitterly for the valuable pelts found there. La Vérendrye, a Frenchman, and his sons made two trips into North Dakota in 1738 and in 1742, in their effort to find a water route to the Pacific. They paid their expenses by fur trading. They set up trading posts, and other traders followed. The first map of the area was made by David Thompson about 1797 for the fur-trading North West Company. Pembina was established in the northeast in 1801 by Alexander Henry, Jr., an agent for the North West Company. It became a leading trading post. (*See* Furs and Fur Trade.)

WHERE RUNNING WATER BUILT A PYRAMID



Rugged buttes stud the Missouri Plateau of western North Dakota where the waters of myriad streams have cut away the soft sandstone, leaving the harder rock in many fantastic shapes.

Explorers and Colonists

Following the Louisiana Purchase by the United States, Lewis and Clark made their way up the Missouri, and camped in a Mandan village during the winter of 1804–5. They found there the Indian woman, Sacagawea, who guided them westward (*see* Lewis and Clark Expedition).

About 1812, a party of Scottish colonists from Lord Selkirk's settlement in Manitoba came to Pembina, where they set up a fort and increased the fur trade. Scientists came to study the natural wonders of the new country—John Bradbury and Henry M. Breckenridge in 1811, Prince Maximilian and Carl Bodmer in 1832, and John James Audubon, the great American naturalist and artist, in 1843.

Finally the wilderness was no longer left to the fur hunters; ranchers and farmers entered and began to build homes. Steamboats, plying up and down the Red River and the Missouri, replaced the old oxcart. The government then set up military posts to protect the travelers and inhabitants from the Sioux Indians, who were making a last fight for their rich hunting grounds.

From Fort Abraham Lincoln, on the Missouri, Gen. Alfred H. Terry, Col. George A. Custer, and Maj. Marcus A. Reno set out on May 17, 1876, to crush the Sioux uprising under Sitting Bull, Crazy Horse, and Gall. Custer and his men were slaughtered at the battle of the Little Bighorn River in Montana. Major Reno's battalion, besieged on a cliff, was saved from the same fate by the approach of General Terry's force (*see* Custer). Captain Grant Marsh, one of the hardy pioneer steamboat pilots, carried Major Reno's many wounded men back to the fort on his steamer.

Railroads Bring Settlers

When the railroads reached North Dakota, settlers thronged into this rich wheat land. The Northern Pacific crossed the Red River at Fargo in 1872, and James J. Hill's Great Northern reached Wahpeton in the 1880's. These rival railways pushed their steel across the state, vying with each other for settlers who would ship great grain crops back east. The roads advertised far and wide in Europe and America the free lands offered by the government under the Homestead Act (*see* Lands, Public). Railroads sold at a low rate the vast acres which the government had given them beside their rights-of-way. Sod houses dotted the prairies, as land-hungry folk from many nations sought a better chance in this open country. Oliver Dalrymple and other capitalists secured great tracts of land in exchange for the stock of the Northern Pacific when it failed, or purchased it from homesteaders. These "bonanza" farms were cultivated by the newly invented agricultural machinery and they often made large profits. Speculation drove land values sky-high.

West of the Missouri vast ranches numbered their herds by the thousand. In the early 80's, the Marquis de Morés with 8,000 acres built the town of Medora and the state's first packing plant. Theodore Roosevelt arrived in search of health and adventure in buffalo hunting and bought two ranches, which he managed between 1883 and 1888. Irrigation and dry farming have replaced some ranches with farms.

North Dakota became a state in 1889, when the territory of Dakota was divided and admitted into the Union as North and South Dakota. Before that it had been included in many territories. The eastern part, drained by the Red River, was claimed by Canada until the treaty of 1818 placed the boundary at the 49th parallel. Then it became a part of Missouri Territory. Later divisions placed it within Michigan, Wisconsin, Iowa, and Minnesota territories. Dakota Territory, formed in 1861, included North and South Dakota. It is named from the Indian word *Dakotas* (meaning "allies"), of the Sioux Confederation whose tribes roamed these plains. (*See also* chronology in North Dakota Fact Summary; United States, sections "North Central Plains" and "Great Plains.")

The NORTHMEN *in the* VIKING AGE

NORTHMEN. Late in the 8th century strange ships appeared here and there in the bays along the coast of Europe. Some of these ships were quite long for those days. They were strongly built of oak, and from forty to sixty oarsmen sat on the rowers' benches. Each ship had a single mast with a square sail which was often striped in brilliant colors. Bright shields overlapped along the gunwale. The ships were pointed at each end so that they could go forward or backward without turning around. They had tall curved prows, usually carved in the shapes of dragons.

These dragon ships, as they were often called, usually appeared in a bay about dawn. As soon as they reached the beach, there sprang from them men of giant size, with bright blue eyes and long yellow hair. Armed with swords and battle axes, and shouting battle cries, they attacked the sleeping villagers. They killed many of them, captured some of the youths and maidens, and gathered all the loot which their ships could carry. Then they sailed away.

These marauders, or pirates, came from what is now Denmark, Norway, and Sweden. The people who lived there were Northmen, or Norsemen. Those Northmen who took part in these swift cruel raids along the coast were called *vikings*. Their expression for this type of warfare was to "go a-viking." *Vik* in Norse means harbor or bay. The word "viking" probably came from that word. At any rate, the vikings came to be the most feared raiders of their time and were the only Northmen with whom most Europeans came in contact. Their name was given to an era which we call the Viking Age, which covered the years from about A.D. 740 to around 1050.

At first these viking attacks were made by small bands. Later there were more men and more ships, which roamed farther and farther from their homelands. To the north and east they harried the Lapps, Finns, and Russians. To the west they conquered and held for generations large parts of Britain and Ireland. To the south they occupied northern France. The Northmen did not actually conquer any country south of France. But their ships sailed along the coasts of Spain and Portugal. They plundered Sicily and the northern shores of Africa and attacked Constantinople, the capital of the Eastern Roman Empire.

To the west the Northmen did not stop with the British Isles but crossed the Atlantic Ocean to take Iceland away from the placid Irish monks who had settled there. In 874 they began to colonize Iceland. And during the years that followed, many freedom-loving people came to Iceland as settlers. About the year 982 Eric the Red sailed west from Iceland. He landed on the coast of Greenland and gave the island its name. Later he founded the first colony there. His son, Leif Ericson, sometimes called Leif the Lucky, is believed by most historians to have been the first discoverer of the North American mainland. About the year 1000 he landed at a place which he called Vinland. Vinland was probably along the coast of the St. Lawrence gulf or in Nova Scotia, although some people believe it may have been much farther south. (*See also* Ericson, Leif.)

While the Northmen were discovering lands and waging war, they were telling each other those adventure tales which later were known as sagas. The word *saga* comes from the Icelandic and means "story." Poets also were singing the praises of Norse heroes and gods and describing the Norse way of life. So the Northmen preserved important parts of the early history of the Scandinavian countries and of Russia, Germany, Britain, and Ireland.

Why the Northmen Were Powerful

Who were these supermen? Whence came their power? Few in number, how were they able to conquer civilized lands with populations greater than those of their own homelands? The Northmen are thought to have been of a blue-eyed and blond stock which, in ages past, had come up from the south and invaded the section later known as Scandinavia. There they found and conquered a short, dark-haired race. Remnants of these dark folk are to be found among Scandinavians today, especially in Denmark and northwestern Norway.

Long-limbed and muscular, with flaxen or red hair hanging below their shoulders, Northmen were trained from childhood to be strong and self-reliant. Running, jumping, and wrestling took the place of reading, writing, and arithmetic. Their other subjects were skating, skiing, snowshoeing, swimming, rowing, and riding horseback. As soon as a youngster could carry a weapon, he was taught to thrust a sword, to swing a battle ax, and to throw a spear.

A part of their success was due to their religion, for the Northmen's gods were warriors too. Thor the Thunderer made constant war on the ice and snow giants of the North. The chief god, Odin, was god of war. (*See also* Mythology.) Death in battle was the most honorable death. Only by that death could a Northman enter Valhalla, the warrior's heaven. So the Northmen battled unafraid and joyous, calling upon their gods to help them.

The Northmen were the most skilled and daring seamen of their day. The compass was still unknown, and they navigated by sun and star. When fog hid the stars, their ships drifted until the weather cleared. Not fearing death, they took great chances. So they gained wide experience and discovered many lands.

The Northmen dared not risk open fires aboard their wooden ships, and in those days there were no stoves. So, unless they were on a long sea voyage, they would anchor in a quiet bay each evening. Then they pitched tents on the shore, kindled fires, and cooked their food. Porridge with dried meat or fish was the usual fare. Sometimes they had bread, butter, and cheese. If they spent the night aboard ship, they unrolled their skin sleeping gear and stretched out on the rowers' benches. A successful viking expedition might bring fortune, fame, and even noble rank to those who took part.

THE VIKINGS AT SEA



In these narrow, shallow boats the vikings made many voyages. They ploughed through the seas east and south of Europe and even crossed the Atlantic Ocean to the mainland of North America. Drawings in this article are by Henry C. Pitz.

So from the time they were 15 or 16, Norse boys were eager to try their swords and their luck in battle.

Trade Is Developed

The early viking voyages were mostly raids in which Christian churches and monasteries were robbed and burned and peaceful villages plundered. But in later times piracy was often combined with trading. A pirate expedition might stop off to do a little quiet trading, and a trading expedition might turn into a little pirating. The Northmen were good businessmen, and they often brought prosperity to the places with which they traded.

As time went on, trade between the Scandinavian countries and with the rest of Europe grew. Norway sent herring and salt to Sweden. Treeless Iceland imported timber, first from Europe and later from North America. Denmark received sheep from the Faroe Islands. Greenland imported timber from Labrador and grain and iron from Europe. It paid for these in walrus and narwhal ivory, furs, live falcons, and even live polar bears. A bear was considered a magnificent gift, fit for a king.

THE COLONY AT VINLAND



About three years after Leif Ericson discovered Vinland, Thorfinn Karlsefni established a colony there. But the natives soon drove the white men away.

Norwegian viking expeditions started in the spring after the seed was sown or in the autumn when crops were harvested. When at home the Northmen were mainly farmers and stockmen. They also hunted and fished. After a successful voyage or two, many Northmen retired from the sea. They were often succeeded by their sons, who begged to "go a-viking" long before they were old enough.

During wars and raids, those not killed by the vikings were often taken as slaves. These slaves were called *thralls* and were usually Irish, Finns, Germans, or Slavs. A free Northman might be enslaved for a debt or crime but this was rare. Many slaves were voluntarily freed by their masters, especially after the introduction of Christianity, and there was much intermarriage. This was especially true in Iceland, where noblemen often married women who had been freed. Many of these women were Irish and are said to have been very beautiful.

Houses of the Northmen

The houses of the Northmen differed according to the resources of each country. In Norway houses were built of rough pine logs. The roofs were usually covered with turf or straw. In Iceland, which had few trees, houses were built of turf, rocks, and driftwood. Both in Iceland and Greenland heavy timbers needed for the frames of buildings were brought from Norway and later also from North America.

A house had only one room and was built with a pitched roof. A poor man might have two or three huts. The estate of a rich man looked like a village, so numerous were its buildings. In later centuries, several of these buildings were often connected by passageways.

The houses were plain on the outside. All the decoration was indoors where most of the woodwork was carved, painted, and touched with gilt. On festive occasions, brightly embroidered tapestries made by the women would be hung on the walls, and long tables were set up for feasting. Everything from a key to the largest piece of furniture was covered with beautiful designs.

Food Was Plentiful

The Northmen had a great variety of foods and beverages. They were fond of meats. Mutton and beef were plentiful. Until its use was forbidden, the most favored meat was horsemeat. The Northmen also used fish and cereals, eggs from wild and domestic fowl, and milk products. Their vegetables were few. Honey was the only sweet, and bees were kept to help out the supply of wild honey. Meat and fish were often dried, smoked, or pickled. Many foods were preserved in

INSIDE A NORTHMAN'S HOME



Here a *chief* sits on the high seat beneath his shields. The picture shows a corner of one of the benches which line the wall. The entertainer is a *skald*, or minstrel poet. The small harp was probably brought from Ireland by some viking raider.

brine or in sour whey, a preservative still in use among modern Scandinavians. Butter was never salted. It was eaten fresh or was fermented for use like cheese.

The Northmen liked both fresh and sour milk and buttermilk too. The favorite drink was whey. They had a food named *skyr*, much like our cottage cheese. Apples and berries were their only fruits. Porridge was cooked in enormous kettles over an open fire. Although boiling was favored for most foods, meat was sometimes baked in hot ashes. Bread was baked in ashes or in clay ovens.

At feasts the Norse drank quantities of ale. They made from honey a fermented drink called *mead*, and the wealthy imported wine from France. There were long and sometimes rowdy drinking festivals, at which sagas were told and poems were recited.

How the Northmen Dressed

All Northmen who could afford it dressed gorgeously for occasions like weddings, funerals, and for *things*, as the parliaments, or assemblies, were called. Skins and furs of tame and wild animals were used, but the most common material was a woven woolen cloth, called *vadmal*. Dyes were expensive so poorer folk used vadmal in its natural color. The rich wore it in bright colors, often striped and patterned in weave. Silk and linen, which were imported and costly, were used mostly for underwear.

Since the Northmen traded with so many countries, they often brought back new ideas for dress and adornment. The native dress of men and women in early times was quite similar. The main garment was a long tunic, which might be narrow or wide. If wide, a belt gathered it around the waist. It was customary to wear a gown of one color and a cloak of another. A man's tunic was usually sleeveless, perhaps to show off his arm muscles and gold arm rings. There were no buttons. A garment had an opening which was slipped over the head and was tightened with a brooch. Girls and young women wore their hair long and caught round the forehead with a band, sometimes made of pure gold. Noble and wealthy men also wore their hair long with a band to keep it in place.

Amusements and Sports

The young Northmen loved games, especially those which helped to develop strong bodies. They played a game of ball in which many players took part. In this game there was a hard ball, *knottr*, and a bat, *knattre*. The games were played either on ground or on ice. Wrestling and fencing were popular sports. Young Northmen skated on skates made of the bones

of animals. These skates they called *ice-bones*. These and many other Norse games and sports were similar to our own, but they had some interesting ones of which modern young people know nothing.

A Norwegian historian tells of a sport in which a young man would walk on oar blades while a boat was being rowed. He says that this was most difficult and required a great deal of practise. Then there were leaping in armor and a game in which two or three small swords were thrown in the air and then caught. To play with three swords at once without injuring oneself required great skill.

Northmen loved music and dancing. They had a *fidla*, or fiddle, a horn made from a buck's horn, and also a kind of harp. The high point at a feast was the performance of a *skald*. The *skalds* were professional poets. They were always welcome at the households of chiefs and at the courts of kings.

Education Was Informal

There were no public schools. All education was given at home, with parent, nurse, or visitor acting as teacher. Children were often sent to the home of a rich man, sometimes a relative, to be educated. More attention was paid to the education of boys than to that of girls, but girls were not neglected. They learned to spin, weave, and dye wool; to sew, knit, and embroider. They were taught to wash and to cook; to make butter and cheese. Even the noblest young ladies learned these things. There was no stigma attached to work, and a guest might be served at the table by the wife of a chieftain. Both girls and boys learned to sing, to recite and compose poetry, and to tell sagas. Some girls and most boys learned to read and cut runes.

RUNIC ALPHABET

ᚠᚢᚦᚬᚱᚴᚼᚨᛁᚾᛏᛒᛦᛚᛦ

f u th o r k h a i n s t,d p,b m l r(y)

The 16 letters of the Norse runic alphabet appear here with their English equivalents. Note how letters are adapted for carving.

Writing on Stone

Runes were the letters of the ancient alphabet used by the Northmen. Just as we call ours the ABC's, they called theirs *futhork* after the first letters. The early Norse alphabet had 24 letters. The later Norse alphabet, which is reproduced in this article, had sixteen letters.

At first runes were used for scratching names on personal belongings or for simple memorials. Later, as the art developed, these memorials grew more elaborate. Thanks to the lasting qualities of stone, people have been able to follow the trails of the vikings and to read the runes which were carved so many centuries ago. Thousands of these memorial stones have been found on the Scandinavian Peninsula and in Denmark. North of Upernivik, in Greenland, a little rune stone was found, and so we know that some Northmen traveled more than 400 miles north of the Arctic Circle. Others carved runes on the statue of a lion in Athens, Greece.

There is some doubt as to whether any of the runic stones found on the North American continent are genuine. These include the runic stone which was found near Kensington in Minnesota. This stone was discovered in 1898 when someone pulled the stump of a tree from the ground.

Government and Laws

In the early history of the Northmen there were no nations as we know them today. People lived in what might be called tribal communities. These communities were quite independent of each other and they banded together only when they had some common need.

When the title *konungr*, or king, was given to the chief or head man of a community it did not carry the same meaning that it has now. There were many kings. Often one would rule over a small section of land no larger than one of our counties, and some of the kings were war chiefs who had no land.

Each community had a *thing*, or assembly, which acted as both a court and a legislative body. Only those who owned land could be members of *things*. A king could hold his position only as long as the people wanted him. Before a new king could take office, he had to have the consent of the members of the *thing*.

Next in rank were the *jarls*, who often had about as much power and land as the kings. Both kings and jarls had to rule according to law. No laws were written down until around 1100. Before then the laws were really traditions and opinions of the majority of the people. The people elected *law men* who had to know these unwritten laws. They explained them to the kings and to the men who sat in the *things*.

Later in Sweden and in Denmark people began to unite under one king. In 872 Norway had a single king, known as Harald the Fairhaired. But Harald did not attempt to organize a *thing* for the whole of Norway. He also undid much of Norway's unity by giving each of his numerous sons the title of king. So Norway remained divided for some time.

When Harald became king of all Norway, some of the people did not like it. Many of them went to Iceland and founded a colony there. While the people of Iceland did not unite under one king at that time, Iceland was the only country to form a national *thing* during the Viking Age. This was called the *Althing*. It met first in 930 and is the oldest national assembly in the world. In 1930 the United States and other governments that have parliaments and congresses joined with Iceland to celebrate the thousandth anniversary of the founding of its *Althing*. At that time the United States Congress presented to Iceland's *Althing* a statue of Leif Ericson, the discoverer of the North American mainland.

Christianity Is Accepted

A handsome young king, Olaf Tryggvesson of Norway, became a convert to the Christian religion some years before 1000. His passion for the new religion was backed by a military force which threatened all who refused baptism. Some Northmen were already Christians, mainly through Irish influence, though on the

whole, these rough warriors were content with their own gods. Gradually Norway was Christianized, then the Faerae Islands and Iceland and finally Greenland. The first Christian missionaries in Greenland were brought there from Norway by Leif Ericson.

From the Graves We Learn about the Northmen

A chieftain was buried with everything he might need to get to Valhalla. One third of his property might be used in this way (a third went to his widow and a third to his children). His grave contained weapons, horses, chariots, boats, and even ships. Money, tools, and changes of clothing were buried with him. Women's graves contained the things they might need, such as needles and thread, weaving looms, kitchen utensils, and cooking vessels.

Sometimes a dead warrior would be put aboard his ship. Then the ship was set afire and drifted out to sea. Less wealthy people were buried in boat-shaped coffins which were covered with earth mounds. Fortunately, ships and other property were often not burned, and a few ships have been preserved to our time.

Next to the sagas, the graves have been our best sources of information about the Northmen. In Scandinavian museums there are examples of almost every art known to the Viking Age. Among these are jewelry, weapons, furniture, and bronze and silver utensils. Most of these have survived because they were made of durable materials, such as stone, metal, and hardwood. But woolen clothes in good condition have been recovered in parts of Greenland where the soil has remained frozen for thousands of years.

RUNIC STONE MONUMENTS



Such runic stones as these at Jelling in Jutland, Denmark, were carved by Norse craftsmen about the 10th century. They were monuments to the dead and were placed in the graveyards. Note the elaborate conventional designs around the figure.

History from the Sagas

The Northmen, like the Greeks of Homer's time, were storytellers and poets. At all gatherings of parliaments, at weddings, funerals, and so forth, those skilled at storytelling and in the reciting of verses would perform.

When Christianity came to the mainland of Scandinavia, folk poems and stories were frowned upon by the clergy. But Iceland was protected by distance from the influence of Europe. So, long after Christianity became the official religion, the Icelandic people strove to preserve their historical and literary heritage. Bishops and other religious leaders enjoyed the storytelling and saw in it nothing which would offend God.

During the 12th and 13th centuries, the clergy and scholars of Iceland wrote many manuscripts. All were written as the saga tellers related them. Some were true and some were pure fiction. Among the serious historical records are sagas which tell of the kings and of viking conquests. They tell of the discovery and colonization of Iceland and Greenland and of the discovery of the American mainland.

Two important manuscripts dealing with the religion and philosophy of the Northmen were written in Iceland. These we know as the Elder Edda and the Younger Edda. The first is in poetry; the second is in prose. Much of what we know of early Norse mythology came from the Eddas.

In modern times, the Eddas and many of the sagas have been published in book form in Iceland and elsewhere. Most of them have been translated into modern Scandinavian and other European languages. These are studied by students in many universities and are read in nearly every corner of the world.

Viking Age Ends

As has been said, the early religion of the Northmen was partly responsible for their love of war. As Christianity spread, the Northmen made fewer and fewer raids upon other peoples. And so passed the Viking Age. The descendants of the Northmen are called Scandinavians and live mainly in Denmark, Norway, Sweden, and Iceland. Millions of them are scattered in many countries, including the United States and Canada. In Iceland much of the old Norse language has been retained. In Norway, Sweden, and Denmark the languages are as different from the old Norse as modern English is from early Anglo-Saxon. (*See also* Denmark; Iceland; Norway; Sweden.)

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NORTH SEA. One of the most treacherous seas in the world for ships to navigate is the North Sea. It is often rough, stormy, and covered by thick fogs. It is shallow and laced by swift, tangled currents. Yet at all times the North Sea teems with ships. Freighters move constantly along its sea lanes. Smaller vessels roll and pitch over its fishing grounds, probably the richest that have ever existed. Commerce and fishing make the North Sea one of the most important bodies of water in the world.

Except for two long arms the North Sea is roughly rectangular in shape, some 600 miles long and 400 wide. It lies between Great Britain and Scandinavia. The Low Countries and parts of the German and French coasts close it in at the south. At the north it lies open to the Atlantic. One arm reaches southward and connects it with the Strait of Dover and the English Channel beyond. Another, formed by the narrow Skagerrak and Kattegat, hooks around Denmark to reach the Baltic Sea.

Most of the North Sea lies on the continental shelf of Europe (*see* Earth). This area was dry land until after the Ice Age. Then flooding formed the present shallow sea, which averages only 312 feet in depth. Dogger Bank, off the British coast, is an ancient plateau. Here at one point the water is no more than 40 feet deep. A deep trough, the Norway Deep follows the curve of the Norwegian coast and enters the Skagerrak. Parts of this Norway Deep are more than 2,000 feet in depth.

Shallowness partially accounts for the North Sea's rich fisheries. Storm waves stir the bottom and bring up the minerals on which tiny plants and animals called plankton live (*see* Ocean). Plankton are food for a large fish population. Certain fish also thrive in a mixture of warm and cold water and of fresh and salt water. The many rivers emptying into the North Sea help supply such a mixture. Fishermen take great catches of cod, herring, mackerel, and others. The best grounds are along the British coast, especially on Dogger Bank where shallow water makes trawling easy. (In the Dutch language *dogger* means cod.) The bays of the North Sea abound in lobsters, oysters, and other shellfish.

This sea and its connecting waters wash the shores of powerful commercial countries. Most of the great port cities of western Europe are on these waters. London, Antwerp, Rotterdam, Hamburg, Copenhagen, and Oslo are a few of these. Ships continually cross the North Sea, carrying cargoes of timber from Norway; iron from Sweden; farm products from Denmark and the Netherlands; and manufactures from the United Kingdom, Belgium, and Germany. At the southern end of the North Sea, where the mouths of the Thames, Scheldt, Meuse, and Rhine converge, is the densest sea traffic anywhere in the world.

Since the early Middle Ages North Sea trade has been important. For centuries it was dominated by the powerful Hanseatic League of cities (*see* Hanseatic League). Since then, many battles have been fought for the control of its strategic waters. Most important of these was the great battle of Jutland in World War I.

NORTHWEST TERRITORIES, CANADA. About one third of all Canada is comprised in the huge wilderness known as the Northwest Territories. This consists of a plain stretching north from the Prairie Provinces to the Arctic Ocean and continuing with a great group of islands, the northernmost of which extends to within 475 miles of the North Pole.

The total population was only 16,004 in the 1951 census, mostly Indians, half-breeds, and Eskimos. A few white people live near the mines and at the trading posts of the Hudson's Bay Company (*see* Hudson's Bay Company). In recent years mining has come to rival the fur trade as the most important industry. The mine at Great Bear Lake is one of the world's chief sources of radium and uranium. Silver, gold, and petroleum are also being exploited. Most of the area is still unexplored and is uninhabitable for white men because of the severity of the climate. About half is comprised in the great plain known as the Barren Lands. In the west, along the valley of the Mackenzie River, the soil is fertile and the climate somewhat more moderate so that vegetables and hardy cereals are raised at the trading posts.

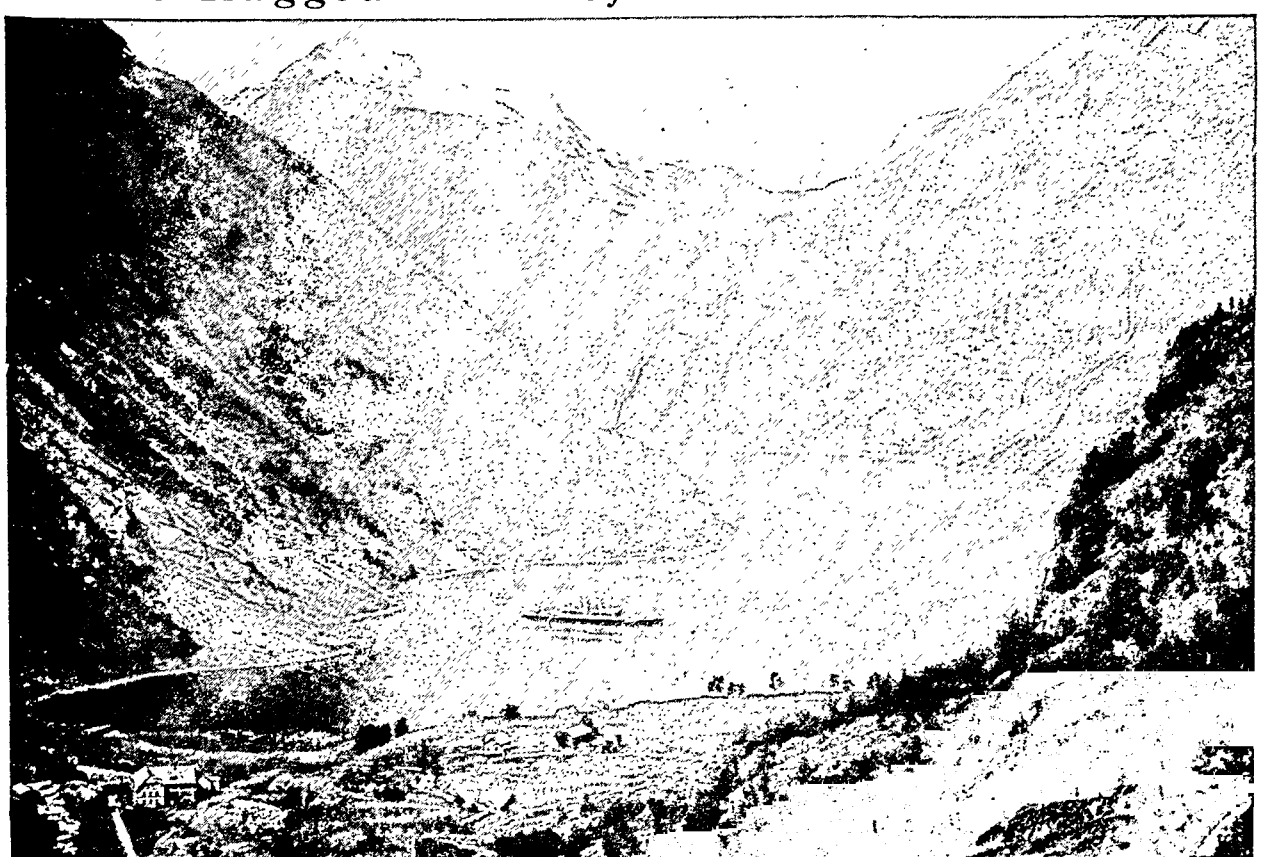
Until 1869 all the region was part of the immense possessions of the Hudson's Bay Company. It is administered by a commissioner appointed by the government of Canada and by the Royal Canadian Mounted Police and is divided into the provisional districts of Mackenzie, Keewatin, and Franklin.

NORTHWEST TERRITORY. When the 13 American Colonies won their independence from England, six of the old states, on the basis of their old sea-to-sea grants, claimed sections of the great unsettled regions between the Allegheny Mountains and the Mississippi River. The state of Maryland had no western lands and felt "that the back lands, claimed by the British crown, if secured by the blood and treasure of all, ought in reason, justice, and policy to be considered a common stock." Therefore, it refused to ratify the Articles of Confederation until the other states had given their western lands to the federal government.

Having acquired this territory, Congress had next to devise some means for governing it, and in 1787 an ordinance was passed which has been declared to be second in importance only to the Declaration of Independence and the Constitution. It provided that the region should be divided into not less than three or more than five states; that it should be governed at first by officers appointed by Congress; that after it had 5,000 free male inhabitants a house of representatives should be elected, which could select a delegate to Congress with the right to debate but not to vote; and that when any of the divisions of the territory had 60,000 free inhabitants it should be admitted to the Union "on an equal footing with the original states." The law also allowed freedom of religion, habeas corpus privileges, and jury trial. It declared that "schools and the means of education shall be forever encouraged," and finally, it prohibited slavery in the region "northwest of the river Ohio." The means of encouraging education had already been provided in an ordinance originating with Jefferson in 1785, which provided for the survey and sale of the land, and for the giving of $\frac{1}{36}$ of the national domain to the new states for the support of public schools.

The plan of government worked out by Congress for this region was followed in all later "territories" of the United States. Out of the original Northwest Territory were carved the states of Ohio, Indiana, Illinois, Michigan, and Wisconsin.

The Rugged LAND *of the* MIDNIGHT SUN



The coast of Norway is famous for its saw-tooth pattern, with fiords cutting deep into the land and forming excellent harbors. Here we see the end of Geirangerfjord, in the southwest, surrounded by cliffs from 3,000 to 5,000 feet high.

NORWAY. The beauty of this rugged, northern land is world famous. Deep, slender bays, called fiords, pierce its jagged coast. Their green waters reflect high, steep, rocky walls and sparkling waterfalls. Forests climb up the mountain slopes to ridges covered with snow and ice. But beautiful Norway has little fertile land, and the short, cool summers make poor growing weather for crops. It also lacks coal and many raw materials. Yet its frugal, persevering people can earn a living by making the best of their few natural resources. They have created a sturdy and respected nation.

The farmers till every inch of the small fields between the fiords and the cliffs. They plant crops that ripen in the short summers. To save the lowland grass for hay, they drive their cattle to the high mountain meadows for summer pasture. By fall the log storehouses are full of produce for winter use. After the harvest, farmers and their sons work in logging camps or on fishing vessels.

The people make the sea give them much of their food and provide a living for thousands of men. Norse fishermen get huge catches of fish from the cold waters to supply home tables and sell abroad. Fear-

less Norse seamen and sturdy ships carry cargoes to every port in the world.

From their forests the Norwegians get the logs to build snug houses, wood for fires, and timber for shipbuilding and pulp and paper factories. The loggers chop the trees on the mountainsides in winter and float them to the sea when the rivers thaw.

The people use the money earned by their ships and by selling timber and fish to other countries to buy foreign foods they cannot raise at home. They also import raw materials and coal for their factories. To cut down the need for imported coal, engineers have built huge power plants that take electric energy from the country's waterfalls. This supply of power and the skill and industry of Norwegian workers have helped make Norway a manufacturing nation.

Extent.—Southwest to northeast, about 1,100 miles; east to west 60 to 250 miles. Area, about 125,000 square miles; coast line, including fiords and islands, about 12,000 miles. Population (1950 census), 3,278,546.

Natural Features.—Surface a rugged tableland, with numerous isolated mountain masses, snow fields, and glaciers. Chief ranges: Kjölen or Keel, between Norway and Sweden (highest point, Jaeggevarre, 6,283 feet); Dovre Fjeld (Snehaetta, 7,615 feet); Rjondane Fjeld (Högronden, 6,929 feet); Jötun Fjeld or Jotunheim (Galdhöpiggen, highest mountain in Scandinavia, 8,160 feet). Largest glacier in Europe, Jostedalsbrae (area, 580 square miles). Principal fiords: Oslo, Bokn, Hardanger, Sogne, Nord, Trondheim, Geiranger, Vest (West), Lyngen, Varanger. Chief rivers: Glomma, Drammen. Numerous lakes.

Products.—Hay, oats, barley, rye, wheat, potatoes; cattle, sheep, and dairy products; cod, herring, mackerel, and other fish; whale oil; iron, copper, nickel, silver; lumber products, chemicals, paper, and food products.

Cities.—Oslo (capital, 434,047); Bergen (112,845); Trondheim (56,669); Stavanger (50,647); Drammen, Kristiansand, Haugesund, Alesund, Moss, Skien (over 15,000).

A Mountainous Northern Land by the Sea

Norway occupies the western coast of the Scandinavian peninsula in northwestern Europe. On the map we see that it extends about 300 miles beyond the Arctic Circle to 71° N. latitude. Here the sun stays above the horizon for about two months in summer, making night as light as day. This gives the country the name, "Land of the Midnight Sun." Even in southern Norway summer daylight lasts far into the evening. But winter days are brief; and for about two months in winter, the sun fails to rise along the far north coast.

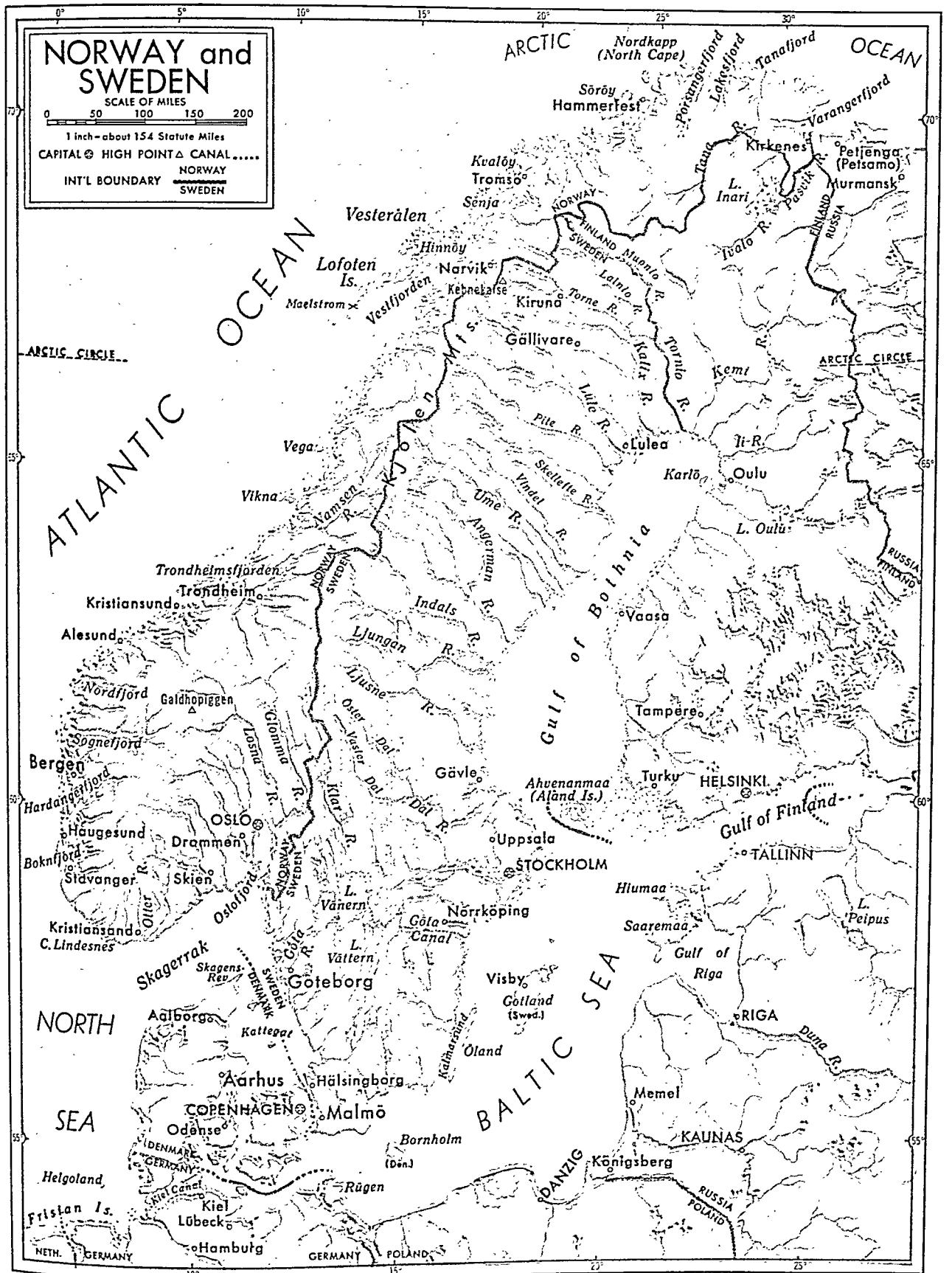
The Kjölen Mountains and related ranges make a rocky backbone for the country. For most of their length the central ridges form the Swedish boundary. From this crest the surface continues into Norway as a high plateau. Short, swift rivers have gashed deep canyons in the plateau, and here and there peaks rise to altitudes of from 6,000 to 8,000 feet. Heavy snow on the peaks and plateau feeds the most gigantic glaciers in all Europe. One of them, the Jostedalsbrae, covers 580 square miles and is 1,400 to 1,600 feet thick. It thrusts giant arms of ice into the neighboring valleys. In some of them the ice reaches as far as the sea. The sharp western edge of the tableland drops abruptly into the ocean in high cliffs. Along this edge, the ocean flows into the valleys, making the long, narrow bays known as fiords. Some 150,000 rocky islands, called the Skjaergaard ("skerry fence"), follow the coast line. They guard an inland passageway of calm coastal waters against the fury of North Atlantic storms. The islands and

GAY COSTUMES OF NORWEGIAN CHILDREN





The 'small girl in the top picture belongs to a tribe of Lapps who pasture their reindeer herds in the cold interior of Arctic Norway. Her suit and cap of reindeer skin are trimmed with bright wool. The upturned toes of her moccasins are stuffed with moss to keep her feet warm. The city children in the lower picture are "dressed up" in traditional peasant costumes with red vests and embroidered caps.



The Scandinavian peninsula hangs from the shoulder of Finland like a partly raised arm. About two-thirds of the boundary between Norway and Sweden follows the ridge of the Kjölen Mountains; then the line runs southward to the sea. Most of the peninsula's rivers flow southeast across the Swedish plains that slope gently to the Gulf of Bothnia and the Baltic Sea. In Norway short, swift rivers plunge down the sharp descent of the mountains to the ragged coast fringed by thousands of islands. About one-fourth of the Scandinavian peninsula lies north of the Arctic Circle.

the jagged indentations of the fiords make the coast line measure about 12,000 miles—or half the circumference of the earth.

Since mountains and rock-bound coasts make up most of the surface of Norway, we can see why the country is almost three-quarters unproductive. Less than 4 per cent is suitable for farms or even meadowland, and about 24 per cent is forested.

Three regions account for most of the cultivated land and a great part of the forests. The first is in the south where the Swedish boundary falls away from the mountains, leaving their eastern slope to Norway. This is the Oslo region, which slopes gradually down toward the Oslofjord. Rivers flow into this great fiord from all directions. Farms fill the valleys, and timber covers the slopes and the dividing ridges. The second good farming region is the Trondheim depression, the single break in the mountain backbone. Here a low valley provides easy travel into central Sweden. The soft limestone has been eroded into rolling plains, where hardy crops flourish. The third farming region lies around the southernmost bulge of Norway, where the mountains stop short of the sea, leaving a region of low hills and marshland. Forests grow on the lower slopes and some of the land is suitable for grain and dairy farming.

Sea Winds Temper the Climate

Since Norway lies far north in about the same range of latitude as Greenland, Siberia, and the Alaskan mainland, it might be supposed that its climate would be equally frigid. Instead, temperatures along the coast are quite moderate and the harbors are ice-free far into the Arctic. This is because the warm ocean current known as the North Atlantic Drift flows past the coast. The prevailing winds from the west blow over this warm water and temper the Norwegian climate. Average temperatures for February on the Arctic coast are 25°F., and on the coast below Trondheim they are above freezing. Because the mountains prevent the sea winds from reaching Oslo, it gets colder there. In the bleak Arctic interior the thermometer may fall to −46°F. Summers are cool with averages along the west coast ranging from 55° to 65°.

Rainfall and snowfall are heavy because the sea winds drop their moisture as they rise above the mountain wall. The southwest gets the heaviest rains—measuring 87 inches a year at Bergen. The moisture diminishes on the eastern slopes, and Oslo receives about 24 inches.

How the People Live

With a population of only 3,277,000, Norway is the most sparsely populated of the European nations. The tall, blond people of Teutonic stock have lived here since Viking days when their fierce sailor ancestors scoured the northern seas (*see* Northmen). They are industrious and hardy. Their average per capita savings are normally greater than those in the United States: health standards are high; and they are a long-lived people.

Because a great many Norwegian farm families live in isolated valleys or deep within the fiords, they retain their old ways of life. The typical farm home is snugly built of brown logs. Its steep-pitched roof is covered with sod, where grass and flowers bloom in summer and a layer of snow gives extra warmth in winter. Inside, quaint wood carvings decorate door panels, cupboards, and the mantel above the big fireplace. Barns and other buildings cluster around the house. The *stabbur*, or storehouse, is filled with food to supply the table for months, since shopping trips are rare, especially during the long winter.

The family must work hard to fill the larder. Spring comes late, and the men must hurry to dig out the rocks pushed up through the soil by the frost, so the crops can be planted. The schools have a long spring vacation so the children can help with the planting, and another in the fall when the potato crop is harvested. Boys and girls enjoy such tasks as caring for the lambs, calves, and kids, and journeying to the woods to pick juicy cloudberries and blueberries.

On Midsummer Day, June 24, the household loses the help of two members, for it is time to drive the cows, sheep, and goats up the steep mountain trail to the *saeter*, or high pasture. An older daughter takes charge as milkmaid, and a young brother goes along to watch the grazing stock and bring it in at milking time. The milkmaid churns butter and makes cheese from the goat milk.

Harvest time is the most strenuous. Men and boys swing the scythes, and even use sickles to get the stalks that have grown in rocky corners, for the fields are too small for machine reapers. After the hay is cut and raked, it must be hung to dry on wires strung between poles. If piled in stacks, it would mold in the cloudy rainy weather.

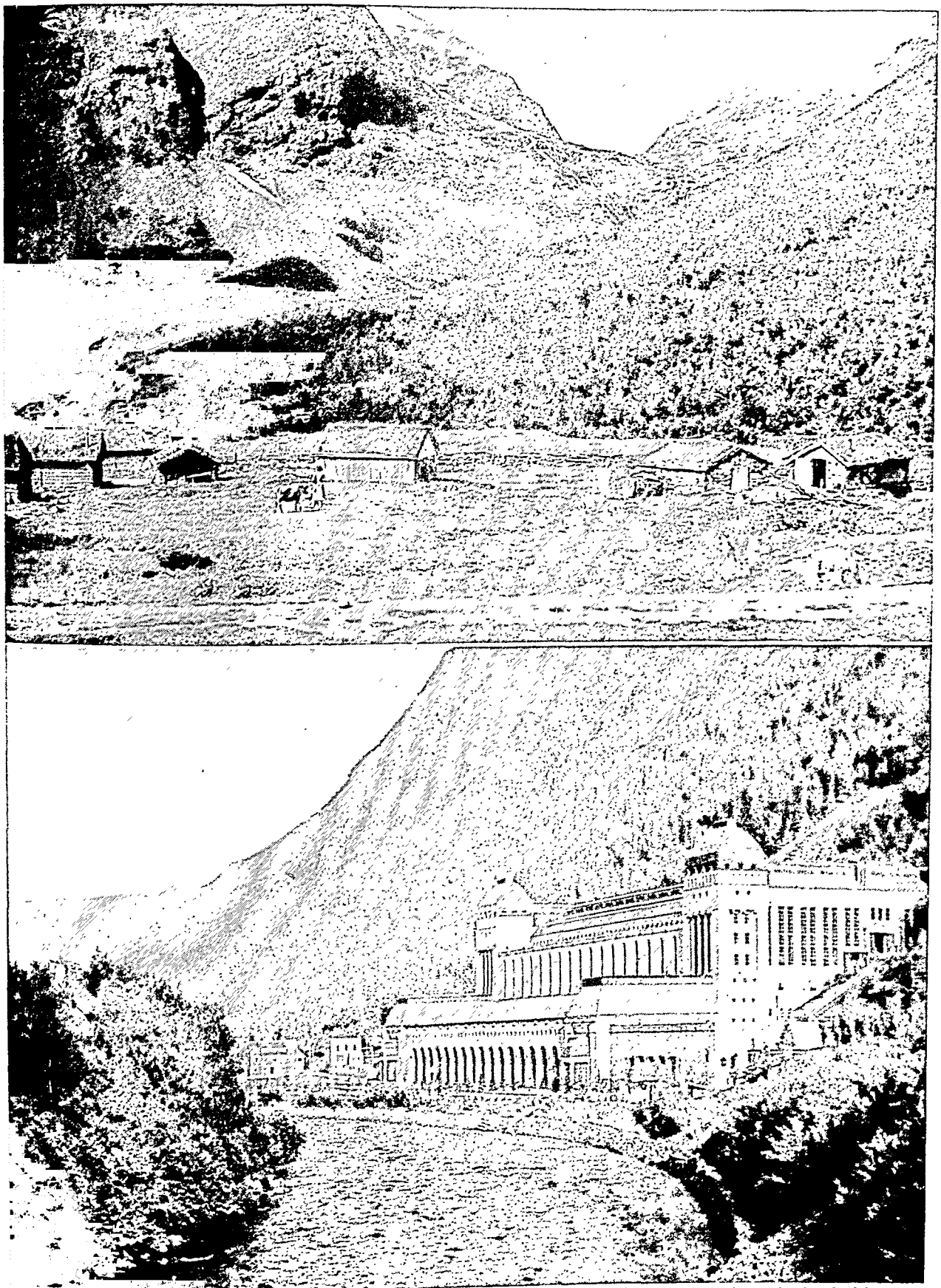
Housewives keep busy, for their families eat four or five hearty meals a day to provide heat and energy for outdoor work in this cool climate. The task of feeding the stock that must be kept in the barn during the winter usually falls to the women and the sturdy youngsters of school age, for the farmer and his older sons seek work away from home. Most of what the farm produces is needed to feed the family and the stock. So the money for clothes and other supplies must be earned elsewhere.

Lumbering and fishing provide most of the extra jobs. Groups of men spend the winter weeks in logging camps, and other groups from the fiord community may jointly own a motorboat or steam craft in which they sail to the northern fishing waters. Here they brave the cold stormy seas to put out nets or long lines equipped with many hooks and catch huge cargoes of codfish. Part of the catch is sold and part is dried and brought back for the families of the crew.

Entertainment, Sports, and Education

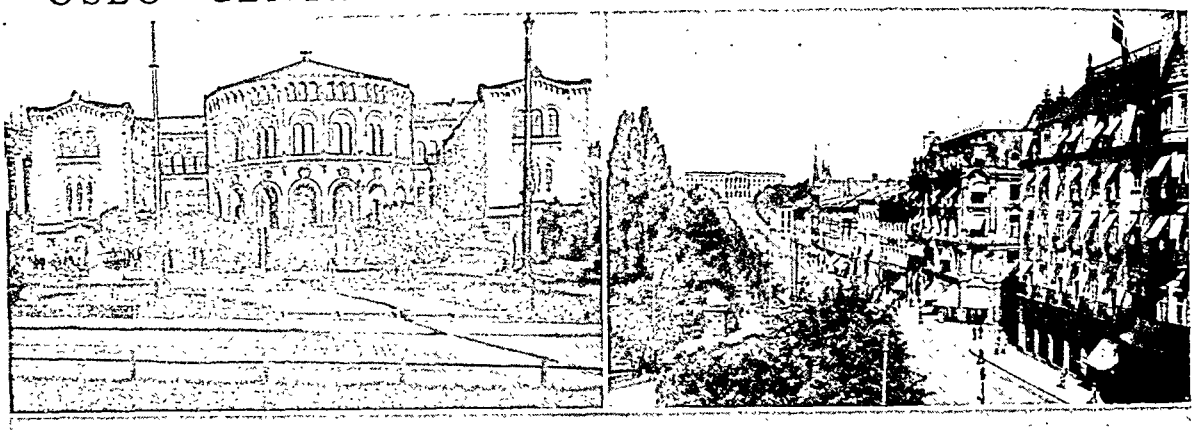
Though the Norwegians work hard, they find time for sports and festivities. Midsummer Eve calls for gay parties to honor the girls who leave next day for the high pastures. Christmas brings gifts and feasting. Every child, boy or girl, puts a dish of holiday pudding in the barn for the Yulenisse, or Christmas elf, who is expected to eat the food and leave a gift for

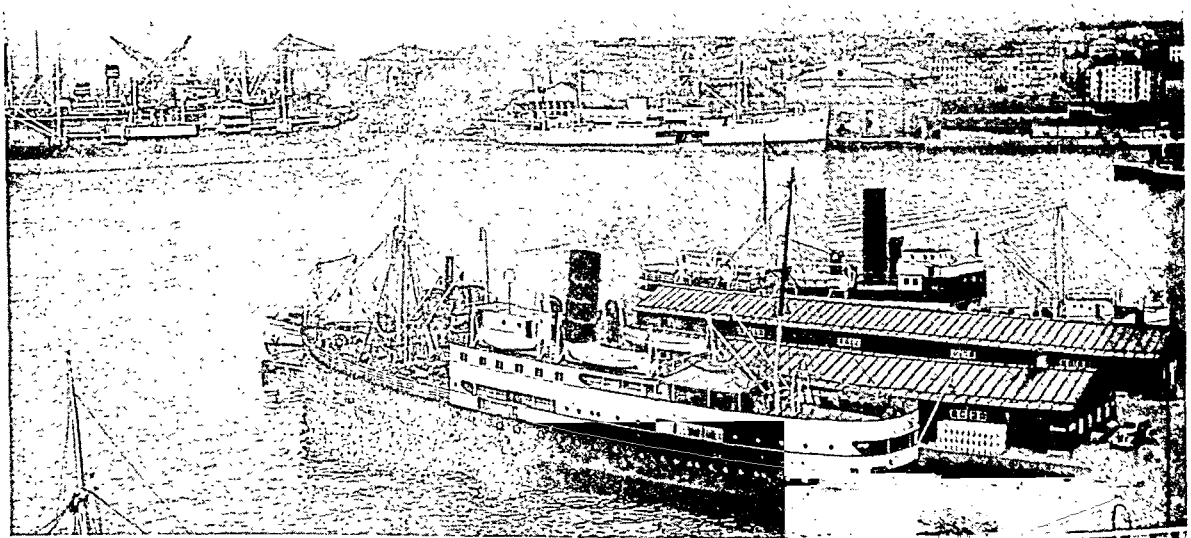
PASTURE, TIMBER, AND POWER FROM THE MOUNTAINS



The top picture shows the sod-roofed barns and the tiny cabins of a *saeter*, or high pasture, where the herd girls make butter and cheese. Below, a modern hydroelectric plant stands beside the mountain stream whose rushing waters spin its turbines to make power for an electrochemical factory. Those forests provide timber—Norway's leading raw material.

OSLO—CENTER OF LEARNING AND COMMERCE

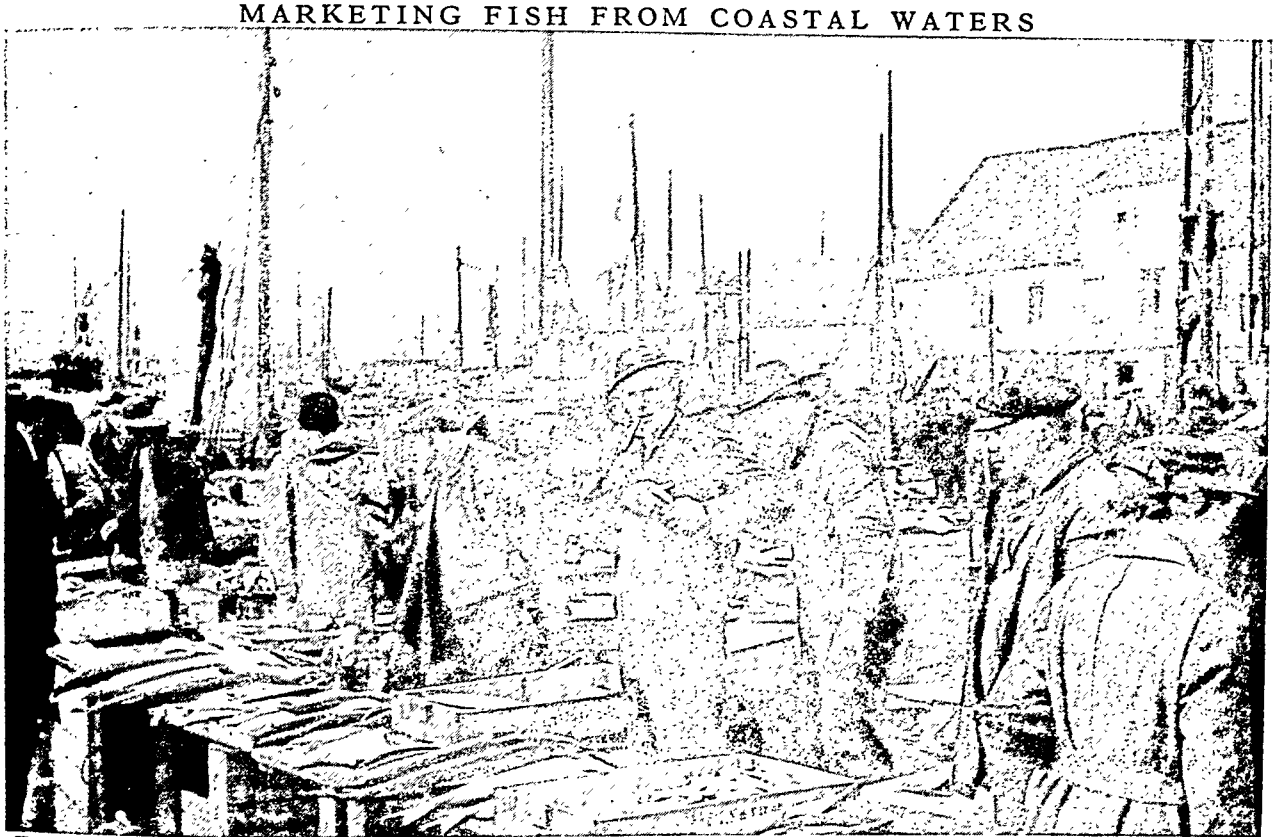






At upper left stands the building in which Norway's Storting, or parliament, holds its sessions. At upper right, Karl Johansgate, Oslo's leading street, slopes upward toward the Ionic portico of the Royal Palace. In the center picture we see a part of Oslo's busy harbor. At its wharves lie some of the ships of Norway's great merchant marine. The bottom picture shows a group of students standing between classes on the steps of one of the buildings of the University of Oslo. Young Norwegians are generally tall, strong, and serious about their work.

MARKETING FISH FROM COASTAL WATERS



Here on the wharf at the great fish export city of Bergen, fishermen sell their catch to dealers and housewives. The spars in the background would indicate that they still use sailing vessels, but since most of Norway's fishing fleet is power-driven the craft probably carry motors as well as sails. Ocean freighters are moored in the harbor at the left.

children who have been good. At weddings, the people of some communities bring out the traditional peasant costumes. The bride wears a black wool skirt worked with colorful embroidery, a red vest, and a sheer white blouse and apron. On her head rests the bride's gilt crown with its black streamers. Fiddlers lead the bridal procession from the flower-strewn church, and the guests crowd into boats for a trip across the fiord to the wedding party.

Skating and skiing are favorite winter sports, and skis are used for the trip to school and other practical journeys. Giant ski-meets draw entrants from all over the world. Visitors also come from other lands to join in summer sports, such as sailing, fishing in the swift mountain streams, mountain climbing, and hiking.

Elementary schools are free and compulsory in Norway, and illiteracy is almost unknown. Pupils may attend the middle schools and the gymnasiums (high schools) in the towns and cities only if they pass special entrance examinations. The University of Oslo, the Technical College at Trondheim, and the Agricultural College at Aas offer college courses. The state church is Lutheran. Libraries, museums, and scientific societies encourage learning in Norway. Outdoor museums display old houses and their furnishings to show modern folk the way their ancestors lived. Through the centuries Norwegians have made outstanding contributions to Scandinavian art, music, and literature; and Norway's scientists are eminent in many fields, notably polar exploration (*see* Scandinavia; Polar Exploration).

Harvest from Farm and Forest

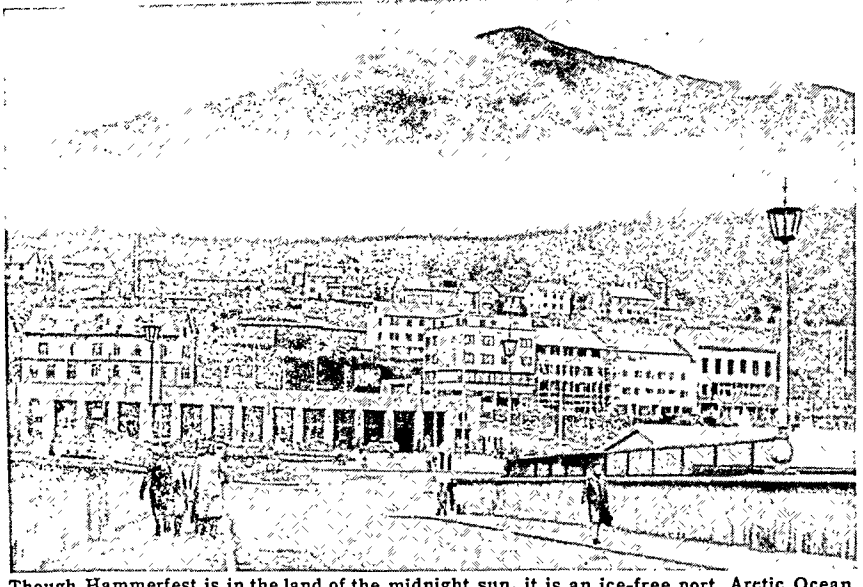
Farming and lumbering employ about 38 per cent of the people of Norway. The farms are small—most of them under five acres—and nearly all owned by the men who farm them. Expert cultivation produces high yields. Hay occupies the greatest acreage. Oats are the chief grain, with barley second, then wheat and rye. Potatoes flourish in the cool, moist climate. Cattle and sheep are raised throughout the country and dairy products constitute the only agricultural export. The farmers have formed coöperative societies to build creameries, cheese factories, and slaughterhouses, to sell eggs and timber, and to purchase supplies.

Timber is Norway's most important raw material, and wood products its most valuable export. The heaviest forests grow in the Oslo region. Three-quarters of the trees are evergreens. They are felled in the winter and floated down the melting streams in spring to sawmills, pulp mills, and paper factories at the mouths of the rivers.

Wealth from the Sea

The generosity of the sea has helped make up for the niggardliness of Norway's land. With skilled seamen, safe harbors, and ample timber for shipbuilding, Norway has throughout history been a seafaring nation. In modern times it has ranked among the four leading countries in its merchant tonnage. The

HAMMERFEST, NORTHERNMOST TOWN IN EUROPE



Though Hammerfest is in the land of the midnight sun, it is an ice-free port. Arctic Ocean fishing fleets market their catch here. Like many northern Norwegian towns, Hammerfest was burned by the Germans in the second World War. This is a main street in the rebuilt city.

earnings of this fleet in carrying cargoes for the countries of the world have helped maintain the trade balance of this country, which must import both food and raw materials. The tourists which the liners bring to see the country's beauty also contribute to its income.

The Norwegians have always depended upon fish from their icy coastal waters for food and for sale as exports. Their catch is usually the largest in Europe. Fishery products make up their second largest export, and 16 per cent of the people make their living from fisheries. Motorized fleets sail to the fishing grounds off the Lofoten Islands in the northwest to catch the huge runs of cod that appear there in January, and later follow the codfish around into the Arctic Ocean. The cod is cured and shipped as "stockfish" which is cleaned and hung to dry in the air, and as "clipfish" which is salted and spread on rocks to dry. Cod-liver oil is pressed from the livers. Herring, mackerel, and brisling are seined in huge quantities along the coast. The brisling are canned as sardines. Halibut, ling, lobsters, shrimps, crabs, and prawns are also taken from the sea. Much of the catch is frozen for export.

The whaling fleets that formerly hunted in northern waters must now sail to the Antarctic to find their prey, but Norway continues to lead the world in whaling (*see* Whale).

Hydroelectric Power Operates Factories

Lacking coal, the Norwegians have harnessed their streams to supply the greatest amount of hydroelectric power per capita of any country in the world. So abundant is this power that they specialize in such current-consuming processes as the manufacture of aluminum and nitrates. Twenty-eight per cent of the people are engaged in manufacturing. Important industries include pulp and paper mills, fish canning, and shipbuilding.

Mining is relatively unimportant. Iron ore, copper, zinc, sulphur pyrites, nickel, and silver are found. Norway's only source of coal is its colony of Svalbard, 400 miles north in the Arctic Ocean. This colony, which consists of the Spitsbergen Archipelago and Bear Island, also has iron, copper, and lead deposits. The colony was acquired in 1920 by international treaty.

Manufacturing is concentrated around Oslo, but widespread development of water power has permitted industries to spring up in many valley towns and in the fishing ports that fringe the coast. Oslo is the economic as well as the political capital of the country (*see* Oslo). Bergen, the second city in size, has been an important fishing and commercial center since the days of the Hanseatic League. Trondheim, the ancient capital, is famous for its magnificent Gothic cathedral where the kings of Norway are crowned. The north Atlantic port of Narvik is the outlet for the rich iron ores shipped by rail from northern Sweden. Tromsö and Hammerfest are Arctic Ocean fishing ports where whaling, fishing, and Arctic exploring expeditions are fitted out. Fifty miles to the north tower the gray barren cliffs of the North Cape.

History of Norway

Out of its dim past as a land of the Vikings (*see* Northmen), Norway emerged in the 11th century as a united Christian kingdom. In 1397 it was joined with Denmark and Sweden in the Union of Kalmar. Sweden later seceded from this union, but for more than 400 years Norway was little more than a dependency of Denmark. Because Denmark sided with France in the Napoleonic wars (1796–1815), the opposing powers backed Sweden in taking Norway from the Danes after Napoleon was overthrown in 1814. For nearly a century Norway was ruled by the Swedish king, although it retained its separate government. In 1905 Sweden yielded to the request of Norway's *storting* (parliament) to dissolve the union. Prince Charles of Denmark was elected king and was crowned Haakon VII in 1906. Norway flourished as a peaceful, progressive constitutional monarchy.

Norway tried to remain neutral in the second World War, as it had in the first. But on April 9, 1940, its peace was shattered by a German invasion (*see* World War, Second). Traitors, headed by Vidkun Quisling, an army major, aided the enemy and set up a Nazi government. Britain and France came to Norway's aid, but Germany's overwhelming power brought surrender in 62 days. King Haakon with his cabinet escaped to London and put Norway's merchant fleet

in the Allies' service. In Norway a strong underground harried the Germans by sabotaging railways, mines, and factories. After the war, in 1945, King Haakon returned. In 1946 Trygve Lie, foreign minister, resigned to become the first secretary-general of the United Nations. Norway began to get American aid from the European Recovery Program in 1947.

In 1949 Norway gave up its traditional neutrality and signed the North Atlantic Treaty. Norway sent noncombat aid to South Korea. In 1951 Oslo became northern headquarters for NATO.

The government tightened control of all Norway's industry in 1953 by passing a law regulating prices and competition. It also began developing thinly settled northern Norway and built a hydroelectric steel mill. By 1954 an increase in shipbuilding put it third in world tonnage. (For Reference-Outline and Bibliography, *see* Europe.)

NOSE. Lung-breathing animals must have an air intake on the outside of the body. In man this structure is called a nose. Similar parts for other animals are called snout, muzzle, or trunk. The nose has two main jobs. It is part of our breathing apparatus, and it holds the olfactory nerve endings that detect smells. The nose is the outer end of the respiratory tract. It filters, warms, and moistens incoming air on its way to the lungs. It also serves as an outlet for exhaled air. The mouth may also be used for breathing, but it is needed only when the nose cannot supply enough air to the lungs. This happens when we have a cold or when we are "out of breath" and have to pant for air.

The nose is a paired structure. Every part on one side has a similar part on the other side. The dividing line on the outside, called the bridge, is the nose bone and its extension, the nasal cartilages. Cartilages on each side give the outside of the nose its shape. Inside, the division is made by the *septum.* This is a wall of bone and cartilage that divides the nose into two cavities. The septum extends from the nostril openings, *nares,* to the nasal part of the pharynx, or *nasopharynx.*

In general the lower cavities are called the respiratory areas and the upper, the olfactory areas. Here the olfactory nerve endings are located. The nerves lead to the under surface of the brain. Inhaled air passes up and across these nerve endings, but exhaled air passes through the respiratory area only. Thus we can smell incoming air but cannot detect an odor in our own exhaled breath. What we call the taste of food also includes its smell. When the nose is "stopped up" by a cold, many foods seem tasteless. (*See also* Smell; Taste.)

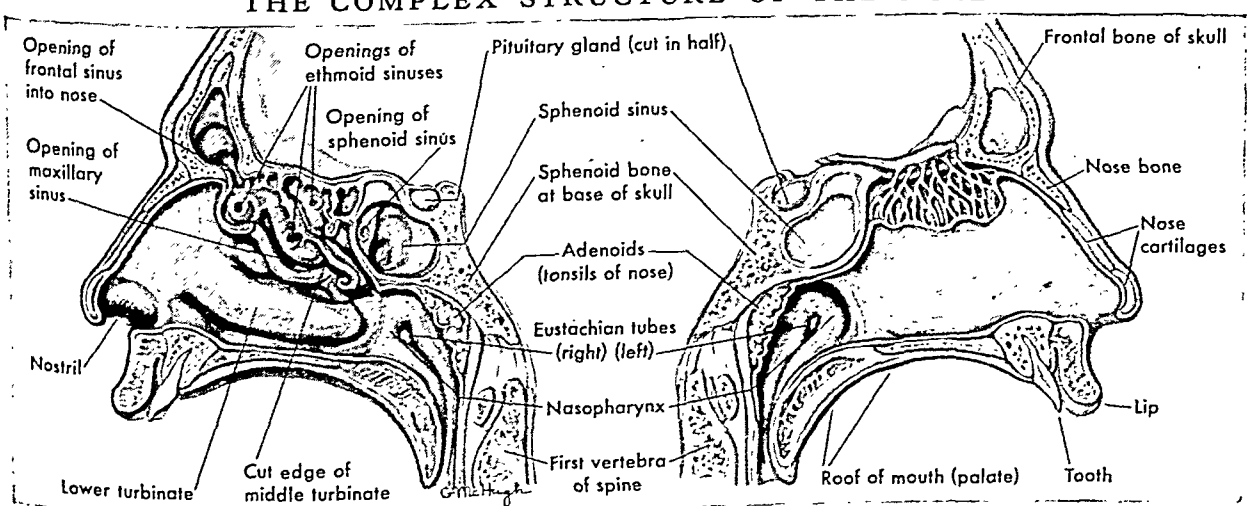
Just inside the nostrils, or nares, grow short, coarse hairs. These filter out large dust particles from the incoming air. The remainder of each nasal cavity and the sinuses around the nose are lined with a special kind of tissue, called *mucous membrane.* The glands in the tissue secrete the sticky mucus which traps fine dust particles. Minute hairlike parts called *cilia* grow from the surface and are in constant motion. They push the dust-laden mucus so that it moves toward and drains into the throat. The mucus also kills some germs and stops the growth of others. In the olfactory area, the nerve endings grow through the mucous membrane.

Inside each cavity are three ridges that extend from the lateral walls (the sides towards the cheeks). These are the *turbinates,* or *conchae.* Their work is to radiate heat, warming the incoming air so that it arrives in the lungs at the proper temperature. The passages between the turbinates are called *meati* (singular, *meatus*). Warm fluids from various glands including the tear glands evaporate in the meati and humidify the air. Incoming air pauses briefly in the meati and then, warmed and moistened, it passes to the lungs in measured quantities.

The Sinuses Around the Nose

The sinuses are cavities in the bones of the skull that have openings into the nasal cavities. There

THE COMPLEX STRUCTURE OF THE NOSE



The drawing at left shows the right lateral wall of the nose, as seen from the inside. The two upper turbinates are cut away to show the ethmoid sinuses. At the right we see the septum (central partition) with the mucous membrane cut away at the top to show the nerves of smell. Notice how the sinuses have openings that lead into the nasal cavities.

are four sets of sinuses: the *frontal*, in the lower forehead, just above the eyes; the *maxillary*, in the cheekbones; the *ethmoid* (or *ethmoidal*), between the nasal cavities and the eye sockets; and the *sphenoid* (or *sphenoidal*), behind the ethmoids, near the center of the head.

The sinuses are filled with air and act as sounding chambers which make the voice more resonant. Their hollow construction makes the skull lighter without loss of structural strength. Otherwise the sinuses seem to have no function or use. Sinus disorders are called *sinusitis*. They arise from a number of causes and often result in a great increase in the secretion of mucus and in the swelling of the membranes, which clogs the small openings of the sinus into the nose. (*See also* Lungs; Respiration.)

NOUN. A noun is a word that *names*. It may name anything of which anybody may think or speak—as *school, America, kindness, justice, children*. If it is the name of one particular person or object or place, it is called a proper noun. In this sense "proper" means "belonging exclusively to." Your name, *Frank* or *Mary*, is a proper noun, because it belongs to you and distinguishes you from other persons. *Fido, Chicago, America, Saturday, The Mauretania, Paradise Lost* are proper nouns. Some proper nouns also denote groups of persons, or a member of a group—Americans, Frenchmen, Democrats, Baptists. Any noun that is not a special individual name is a "common" noun—as *kindness, cloth, city, book*. Such nouns are called "common" because they belong to more than one person or thing. A special kind of common noun is the "collective" noun, which stands for a group of things or persons—*class, grove, flock, jury*.

Most nouns in English have two forms, according to whether they mean one object or more than one. The form which denotes one is called the singular number; that form which denotes more than one is called the plural number—*bird, birds; woman, women*. The plural is generally formed by adding *s* to the singular. Sometimes the *s* plural changes the spelling of the singular—*city, cities; self, selves*. When adding *s*, nouns ending in *y* after a consonant change the *y* to *ie;* and several nouns ending in *f* or *fe* change the *f* to *v*. Some nouns ending in *o* add *es*, others add *s* only—*cargo, cargoes; piano, pianos*. Nouns that end in a sound difficult to pronounce with a final *s* add *es—church, churches*. A few nouns form their plurals by adding *en* or by changing the internal vowel—*child, children; tooth, teeth*. This was the common way of forming plurals in Old English, or Anglo-Saxon. There are also some foreign plurals in common use—*stratum, strata; crisis, crises*. A few nouns make no change for the plural—*deer*.

How Nouns Become Possessive

Many nouns, especially those denoting persons or animals, have another form called the possessive case, because it is chiefly used to denote possession, like the genitive case in Latin. Singular nouns, and all plurals not ending in *s*, add the apostrophe and *s* to form the possessive—*lady's, children's, Brown's*. Plurals ending in *s* add the apostrophe only—*ladies', boys'*. In formal use, most names of things are not used in the possessive; instead of *the book's cover, the chair's back*, the usual form is *the cover of the book, the back of the chair*. But nouns denoting time are often found in the possessive—as *a day's work, a night's lodging, a seven days' journey*.

Besides the possessive case, nouns, like pronouns, have two other cases, according to the construction in which they are used. Nouns do not change their form to distinguish these cases, though most pronouns do. Nouns and pronouns used as the subject substantive of a verb are said to be in the nominative ("naming") case. Nouns and pronouns used as the direct or indirect objects of verbs (*see* Verbs), as the objects of prepositions, and as the subjects of infinitives are said to be in the objective case. A noun or pronoun in apposition with another (that is, used to modify or explain the meaning of another noun or pronoun meaning the same person or thing—as "Caesar, the *conqueror*") is put in the same case as the word it modifies. It is called an appositive.

To give in order the various forms which a noun or pronoun may take, indicating different meanings or uses in the sentence, is called "declining" it, or giving its "declension." Thus the declension of *child* is: singular, nominative and objective, *child;* possessive, *child's*. Plural, *children, children's*.

In addition to number and case, nouns, like pronouns, have two other properties: gender and person. (For a discussion of grammatical person, *see* Pronouns.) Nouns, except those in direct address, are always in the third person. Gender, in English, denotes male, female, or the absence of sex—*prince, princess, table*. Nouns denoting males are masculine; those denoting females, feminine; and those denoting things without sex, neuter. Nouns which refer to both sexes are said to be of common gender—as *people, birds*, etc.

The Work That Nouns Can Do

Some of the chief constructions in which nouns may be used are illustrated in the following sentences:

Subject and predicate noun: A *dollar* saved is a *dollar* earned.

Direct object: He saved a *dollar* a week.

Object of a preposition: He kept account of every *dollar* that he spent.

Indirect object: Association gave that *dollar* a peculiar value.

Secondary or complementary object: I will make your wages a *dollar* a day.

Subject of an infinitive: I want my *dollar* to last long.

Possessive modifier: Give me a *dollar's* worth of sugar.

Adnominal use (like an adjective): This is a *dollar* bill.

Appositive: His pay—a round silver *dollar*—seemed enormous.

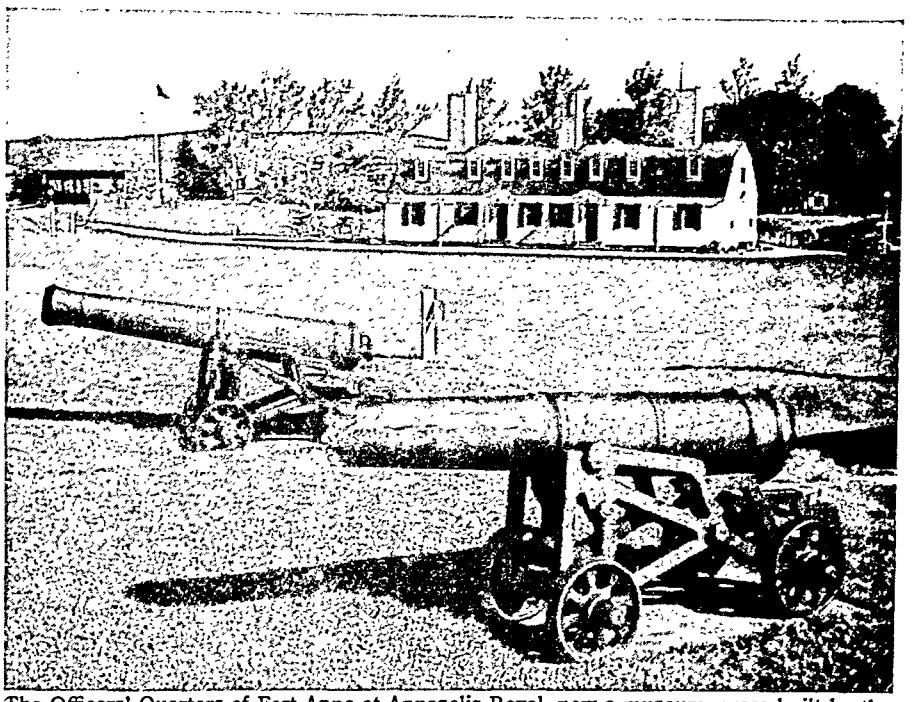
Nominative of address: Oh, *dollar*, why did you slip away?

Nominative of exclamation: A *dollar!* What does that amount to?

Nominative absolute: He turned away, his precious *dollar* clutched tightly in his hand.

NOVA SCOTIA—"DOORSTEP *of the* CONTINENT"

NOVA SCOTIA, CANADA. This maritime province of Canada is called "the doorstep of the continent" from its location at the entrance to the St. Lawrence River, the highway into the interior. It occupies the southeasternmost peninsula of Canada and nearby Cape Breton Island. The Atlantic Ocean lies to the south and east. On the west is the Bay of Fundy. It is joined to New Brunswick on the northwest by the Isthmus of Chignecto. The Strait of Canso, one mile wide, separates the peninsula from Cape Breton Island on the northeast. Northumberland Strait separates it from Prince Edward Island on the north. To the north and west of Cape Breton Island is the Gulf of St. Lawrence. It is the second smallest of the Canadian provinces (21,068 square miles), somewhat smaller than the state of West Virginia.



The Officers' Quarters of Fort Anne at Annapolis Royal, now a museum, were built by the English in 1798. The fort was built by the French in 1702 on the site of an earlier fort.

The peninsula of Nova Scotia and Cape Breton Island are a part of the Appalachian Mountain system of North America. The highest area is in the northern part of Cape Breton Island. It is a great tableland about 1,200 feet high, with bold crags rising 1,500 feet above the sea. The most spectacular section has been set aside in the Cape Breton Highlands National Park (*see* Cape Breton Island).

The peninsula is divided into several sections—the farmlands along the Bay of Fundy and Northumberland Strait; the rocky Atlantic coast whose people are occupied with fishing, shipping interests, and manufacturing; and the hilly, forested interior, thinly settled, with large areas set aside as game sanctuaries.

On the peninsula, the Cobequid Mountains extend for 75 miles across Cumberland County from the head of the Bay of Fundy almost to Northumberland Strait. They are about 900 feet above sea level. Along the margin of the Bay of Fundy, North Mountain extends northeast by southwest for 120 miles. It is a lava range about 550 feet above sea level. The interior of the peninsula is broken with low, forest-covered hills, most of them lying in an east-west direction.

Between the steep, straight wall of North Mountain and South Mountain, farther inland, lies the Annapolis-Cornwallis Valley. It extends southwest for about 100 miles and is 10 to 15 miles wide. This is the garden of Nova Scotia and one of the leading fruitgrowing regions in Canada. Other important farmlands border the shores of Minas Basin and Northumberland Strait.

The entire Atlantic coast, for a distance of 30 to 50 miles inland, is underlaid by ancient pre-Cambrian rocks. Except for a few short river valleys, it is poor farming country and from the beginning of the province's history its people have turned to the sea for a livelihood. In the many coves and bays are fishing villages, fish canneries, and processing plants. Halifax, the capital of the province, is Canada's chief eastern seaport when the St. Lawrence River is closed by ice (*see* Halifax). Yarmouth, on the south coast, has been a shipping center since the days of wooden sailing vessels. Lunenburg has the world's largest fleet of deep-sea fishing vessels. Liverpool and Shelburne are manufacturing centers.

A Moderate Oceanic Climate

The nearness of the sea, never more than 50 miles from any point, gives Nova Scotia a moderate climate. Conditions vary between the Atlantic coast, the Bay of Fundy shores, and the interior valleys and ridges. The average annual precipitation is between 35 and 45 inches, except along the southern coast, where it is about ten inches greater.

The mean temperature in July is 64° F.; the January mean tempera-

Extent.—North to south, 381 miles; east to west, 50 to 150 miles; Area, 21,068 square miles. Population (1951 census), 642,584.

Natural Features.—Mountains part of Appalachians; Cobequid Mountains; highest point, North Mountain on Cape Breton Island, 1,550 ft.; lowest point, sea level. Annapolis-Cornwallis Valley; Bras d'Or salt-water lakes (Cape Breton), Lake Rossignol.

Products.—Fish processing, iron and steel, lumber and other wood products, pulp and paper, shipbuilding, railway rolling stock, butter and cheese, bakery goods; coal, gypsum, sand and gravel, clay, salt; milk, hay and clover, eggs, potatoes, poultry, field roots, oats, apples; lobsters, cod, haddock.

Cities.—Halifax (capital, 85,589); Sydney (31,317).

ture is 25°. The interior ridges are colder and the valleys warmer than these averages. Prevailing winds are from the southwest in the summer and from the northwest in the winter.

Natural Resources and Industry

Agriculture ranks next to manufacturing in number of people employed. The Annapolis-Cornwallis Valley produces as much as 3 million barrels of apples in a year. It also grows pears, plums, strawberries, and raspberries in lesser quantities. Stock raising and dairying are important in the farmlands along Northumberland Strait and in the Margaree Valley of Cape Breton. The chief field crops are hay, oats, field roots, and potatoes Fur farming is also important.

The fisheries are second in value to those of British Columbia. The industry falls into two divisions: the inshore and the offshore, or deep-sea. Mackerel, herring, tuna, and lobster are the chief inshore fish. Cod, halibut, haddock, and pollock are the leading deep-sea fish. Sports fishermen visit the province for tuna, swordfish, trout, and landlocked salmon. In the International Tuna Cup Match, held every summer off Wedgeport, huge tuna are taken with rod and line.

FARMERS AND FISHERMEN



Coal accounts for about 95 per cent of the total mineral production and is second in quantity and value to that of Alberta. It is a hard, bituminous grade, much of it excellent for coking. The chief fields are at Sydney and Inverness, Cape Breton Island, and Pictou and Cumberland on the mainland. Nova Scotia's gypsum deposits are the largest in Canada. There is a salt mine and one of the world's greatest deposits of barytes. Forests cover about 55 per cent of the land area of the province. "Christmas trees" are exported in considerable numbers.

Fish curing and packing leads in value among manufactures. Iron and steel production is second in rank. The steel mills are at Sydney. Coal is near at hand and iron and limestone are shipped from Newfoundland. Sawmills, pulp and paper mills, and shipbuilding are also leading industries. Nova Scotia built wooden sailing vessels from the beginning of its history, and the world's fastest sailing schooners, such as the *Bluenose,* are still built in Lunenberg. Halifax and Shelburne also have large shipyards. Other manufactured products are railway rolling stock, butter and cheese, and bakery goods.

The People, Education, and Government

Of the total population of 642,584 (1951 census), three fourths are of British descent. The French constitute about 10 per cent; the Dutch and German somewhat less. The Micmac Indians were the earliest inhabitants of the region, and some 2,700 of their descendants still live in the province. The population density is 30 persons to the square mile, and more than half live in urban areas.

Nova Scotia has been a leader in the trend toward the larger school administrative unit and the building of rural Composite High Schools. Dalhousie University in Halifax is the largest institution of higher education. Acadia University, at Wolfville, and St. Francis Xavier, at Antigonish, are also important.

Nova Scotia's government is headed by a lieutenant governor. Actual government, however, is in the hands of the legislature of 37 members, elected for a term of five years, and an executive council, or cabinet, consisting of the premier and other cabinet ministers.

History of Nova Scotia

The first European settlement was Port Royal on the shores of



The apple pickers (at top) are working in an orchard in the beautiful Annapolis-Cornwallis Valley near the Bay of Fundy. This is one of the leading fruitgrowing regions in Canada. The fishing village (at bottom) is typical of the Atlantic coast. Lobster crates lie along the street. The picturesque sailing vessels and nets drying in the sun attract many artists to Nova Scotia in the summer.

Annapolis basin in the Bay of Fundy. It was founded in 1605 by Sieur de Monts and Samuel de Champlain. They gave the name *Acadia* to the region, which now includes modern Nova Scotia, New Brunswick, Prince Edward Island, and parts of Maine.

For more than 150 years Acadia was a battlefield in the long struggle between England and France for possession of the New World. In 1613 the English captured and destroyed Port Royal. In 1621 King James I of England granted Acadia to Sir William Alexander and named it Nova Scotia, meaning New Scotland, for his native land. The province still uses the coat of arms created in 1625.

In 1632 Charles I, successor to James I, returned Acadia to France, and Port Royal was resettled by the French. It was repeatedly captured by the English and returned to France until in 1710 the English took it for the last time and renamed it Annapolis Royal. By the Treaty of Utrecht (1713) England gained possession of "all Nova Scotia or Acadie" except Île St. Jean (Prince Edward Island) and Île Royale (Cape Breton Island).

HALIFAX AS SEEN FROM THE AIR



This air view of Nova Scotia's capital city shows the docks along the water front. Halifax is Canada's leading winter seaport. In the upper right corner may be seen the Citadel, the fortress built by England in 1749.

In 1717 France started construction of the powerful Fortress of Louisbourg on Cape Breton Island to protect the entrance to the Gulf of St. Lawrence. In 1749 England founded the city of Halifax and fortified it to offset this threat to its safety. Louisbourg was captured by Gen. James Wolfe in 1758, and two years later it was destroyed. By the Treaty of Paris (1763) Cape Breton Island, together with practically all Canada, was ceded to England. Memorials to those dramatic days remain in the reconstruction of Port Royal Habitation on its original site, old Fort Anne in Annapolis Royal, and the Fortress of Louisbourg; in the Citadel of Halifax; and in the memorial park at Grand Pré. This park recalls the exile of the French in 1755, immortalized by Longfellow in his poem 'Evangeline' (*see* Acadia).

Prince Edward Island and New Brunswick, originally a part of Nova Scotia, became separate provinces in 1769 and 1784 respectively. Cape Breton was reannexed to Nova Scotia in 1820.

With the founding of Halifax in 1749 many English, Irish, and New Englanders arrived. About 20,000 United Empire Loyalists came from the United States in 1783. Between 1791 and 1828 about 50,000 Scottish Highlanders settled in the north peninsula and on Cape Breton Island. Germans, Swiss, and Huguenots early settled in Halifax, and in 1753 more than 1,400 of these people founded Lunenburg.

The first elective assembly in Canada convened in Halifax in 1758. Real power, however, was in the hands of the governor and an appointive council. The struggle for responsible government was led by Joseph Howe, through his newspaper, the *Novascotian.* In 1847 the Reformers won the elections, and in the new administration, formed in 1848, Howe was provincial secretary. From 1860 to 1863 he was premier.

Difficult times began in the second half of the 19th century. Industrial expansion went to the large provinces of Ontario and Quebec, from which Nova Scotia was isolated by geographical barriers. Its natural trade southward to New England was cut off by political barriers and high export duties. An intercolonial railway was needed to unite the three Maritime Provinces, but no one province could afford to build it. Solution of these problems seemed to lie in a union of the Maritime Provinces. In 1863 Howe and the Liberals lost the elections and Dr. Charles Tupper became premier (*see* Tupper). Dr. Tupper arranged a convention of delegates to meet at Charlottetown, Prince Edward Island, in September 1864 to consider plans for union. The convention took on wider significance when Canada West and Canada East (Ontario and Quebec) sent delegates and proposed a union of all Canada. As a result of a series of conferences, the Dominion of Canada was formed in 1867. Nova Scotia became one of the four original provinces.

Economic development proceeded more slowly than in other parts of Canada. Railway, highway, and air transportation, however, improved. New industries developed during and after the second World War, and the tourist trade grew. (For Reference-Outline and Bibliography, *see* Canada; Canadian History.)

Recording LIFE *in* FICTIONAL *Form*

NOVEL. Everyone likes a good story. A short story often satisfies, but sometimes it seems to end too quickly. We want to know more about the people; we want to see how they react to further events. A stage play gives us dramatic moments in the lives of the characters, but only a little physical action can be shown on the stage. Thus for a full picture of interesting people involved in a number of incidents that lead to a satisfactory ending, we turn to a good novel.

A novel may be about 100,000 words long, although this figure varies greatly. Several famous novels are more than a million words long. "Detective" novels run about 65,000 words. A novelette, actually a long short story, runs about 20,000 words. The modern short story, as printed in the popular magazines, has about 5,000 words and a "short short" story is only about 1,000 words in length.

Fiction and Real Life

Fiction, as in the short story or the novel, may be close to real life. The author writes his story out of the raw material of his own direct experiences or from what he has observed or read about the lives of others. A good writer gives his characters the appearance and personality of real people. He places them in a scene where they might very likely live and involves them in a train of events that could easily happen to such people. "Believeableness" is one test of a good story.

The novelist often bases his tale on real life, but a mere chronicle of life does not make a novel. Our daily lives are filled with routine events, but these are common to all of us and not necessarily worth recording in a story. We often start actions that seem important but which come to nothing. In a novel these actions would have no point. Our conversations, even those that bring important changes in our lives, are often cluttered with hems and haws and statements which have little to do with the outcome of the talk. In a novel such conversation—or dialogue—would be rambling and dull.

The work of the novelist is to select and arrange materials from life. He tells enough, but only enough, to give his characters the appearance of reality and to account for their actions. The scene is similarly sketched. He gives us an idea of the time and place and adds only the details that become part of the story. He selects significant events in the lives of his characters and cuts out all action and talk which do not advance the story.

Moreover, the novelist provides contrasts that may not exist in real life. He may contrast a weak character with an energetic one to emphasize the strength or weakness of each. He sets a dismal scene in one chapter so that a bright scene in the next will seem all the sunnier. The novelist may have two characters involved in a perilous adventure; the death of one character makes the escape of the other more exciting.

Thus a good novel consists of facts from real life, filtered through the novelist's imagination to become a well-organized and vital human story. The facts may be distorted to heighten the story, but in a good novel, they seem to remain true. In such a novel we learn what happens—the action; and we learn why it happens—the plot. We see the story come to a satisfying, but not necessarily happy, ending. Perhaps most important of all, we see the characters grow and change, or if they remain unchanged, we end by understanding them more fully.

The Beginnings of Fiction

Modern fiction has its roots in the age-old love of storytelling. Long before men could write they told stories of adventure and valorous deeds. Many of these stories were in verse. The rhythms of the poetry made the stories easier to remember and to hand down from generation to generation. One of these old verse stories is 'Beowulf', written down many centuries after it was first told (*see* Beowulf). Homer chanted his famous Greek tales of adventure, the 'Iliad' and the 'Odyssey'; and succeeding generations of storytellers retold them until they were at last preserved in writing (*see* Homer).

In the Middle Ages the minstrel was a professional storyteller. The upper classes liked his lengthy romances and tales of chivalry, because in them they

FIVE IMPORTANT AMERICAN NOVELISTS



(Left) Charles Brockden Brown ('Edgar Huntly') was the first American novelist to earn his living by writing. Harriet Beecher Stowe (second from left) is the author of 'Uncle Tom's Cabin.' Three American winners of the Nobel prize for literature follow: Sinclair Lewis ('Babbitt,' 'Main Street,' and many others); Pearl Buck ('The Good Earth' and other novels about China); and William Faulkner ('The Sound and the Fury', 'Requiem for a Nun', and others).

found an idealized picture of their own lives (*see* Romance). The poor people liked stories that poked fun at valiant knights and pious churchmen and stories that told of life as they knew it.

A verse tale of ordinary life was called a *fabliau* (fable). A similar story in prose was called in Italian *novella*, meaning "new story," from which the English word "novel" comes. Another type of story arose in Spain. It told of the adventures of a rogue, or *pícaro*, and so was called a *picaresque* novel. Somewhat like the picaresque novel, yet different than anything that had appeared before, was Cervantes' burlesque romance 'Don Quixote' (*see* Cervantes).

The First Novel in English

Many interesting books preceded what is considered the first English novel. Two of them are John Bunyan's 'Pilgrim's Progress' and Daniel Defoe's 'Robinson Crusoe' (*see* Bunyan, John; Defoe). Both make exciting reading, but they do not qualify as novels because of their loose, episodic construction.

The first novel came into being somewhat accidentally. Samuel Richardson was commissioned by a London publisher to prepare a volume of letters that would serve as models. Richardson decided that they would be more interesting and instructive if they were to tell a love story and point a moral. The result was 'Pamela', a sentimental novel in letter form that won great popularity, especially among young women.

Types of Novels

Novels can be classified in several ways, but many novels do not lie wholly within one classification. One general distinction is between *realistic* and *romantic* novels. The realistic novel generally deals with life as it is and depicts characters and events that could be real. Extreme realism is sometimes called *naturalism*. The romantic novel gives greater freedom to the imagination, deals with the more unusual aspects of life, and is usually more concerned with telling an exciting story than with analyzing character.

However, as we have seen, no novel can tell of life as it exists day by day or of people taken directly from life without change. In a real sense, all novels are imaginative; and they all tell some kind of a story for an effect. Thus in many ways the definitions of realism and romanticism tend to merge. Under each definition there may be many varieties. The cool and humorous realism of Jane Austen's 'Pride and Prejudice' is very different from the sordid naturalism of Émile Zola's 'Nana'. The dreamy, faraway romanticism of W. H. Hudson's 'Green Mansions' is in marked contrast to John Buchan's swift-paced romantic adventure, 'The Thirty-Nine Steps'.

The *historical* novel is another type. These may be frankly romantic. Their appeals lie in their exciting and suspenseful narratives, their colorful descriptions, and their adventurous heroes and beautiful heroines. Sir Walter Scott's 'Ivanhoe' is a good example. Another type may use a historical setting to dramatize certain truths which apply equally well today. For example, the novelist may tell of an ancient tyrant who has his counterpart in a modern dictator. Thomas Mann's 'Joseph' series are based on the Old Testament story of Joseph, but the hero's problems, apart from the story settings, are completely modern.

A novel that concentrates on character analysis may be called a *psychological* novel. In it, the novelist uses the action and dialogue to lay bare the inner life of his people. He may also allow a character to reveal himself by the "stream of consciousness" method, in which everything that supposedly passes through the character's mind is set down without order or restraint. This method is not new. In the 1760's Laurence Sterne in 'Tristram Shandy' used it with great success.

The modern science of psychology has made the so-called psychological novel very popular. Yet it must be remembered that great novelists of every age have grasped the principles of psychology and have used them effectively. Such 19th-century novelists as Gustave Flaubert, in 'Madame Bovary', and Feodor Dostoyevsky, in 'Crime and Punishment', were profound students of psychology long before it became systematized into a science.

Another broad class is the *humanitarian* novel. Here the novelist's general purpose is to excite sympathy for the plight of his characters. Charles Dickens was a master at making such appeals. In 'Nicholas Nickleby' he told of cruelties practiced on small boys at certain schools. In the early part of 'David Copperfield', he exposed the evils of child labor. Sometimes the humanitarian novel becomes an instrument for effecting immediate social reforms. Harriet Beecher Stowe's 'Uncle Tom's Cabin' did much to bring the slavery issue in America to a crisis.

Novelists sometimes express their humanitarian ideals by writing of what life may be in the future. Edward Bellamy, in 'Looking Backward' (written 1888) gives an idealistic picture of society in the year 2000 as contrasted to his own time. Other writers have not been so hopeful. Aldous Huxley, in 'Brave New World' paints a pessimistic picture of how inhuman technological efficiency might one day rule the world. George Orwell's 'Nineteen Eighty-four' is an equally grim picture of what society might be like if totalitarianism triumphs throughout the world.

Allegorical novels offer meanings beyond the concrete facts of the story. Characters and other elements of the novel may be symbols for certain abstract concepts. For example, in Herman Melville's 'Moby-Dick', Captain Ahab's furious search for the white whale that had maimed him may be read simply as an exciting adventure story. Melville also meant the whale, Moby Dick, to stand as a symbol of evil, and Ahab to symbolize all humanity. In the novelette, 'The Heart of Darkness', Joseph Conrad uses the colors black and white in many ways to symbolize the changing concepts of good and evil in the story.

Great *humorous* novels are rare, for many so-called comic writers depend upon situations that may be funny for one group of readers but absurd or mean-

ingless to another. The humorous novels that have become classics are based on genuinely comic characters and incidents that, apart from their settings, might have existed in any age. Dickens' Sairey Gamp (in 'Martin Chuzzlewit') and Mr. Micawber (in 'David Copperfield') are magnificently funny people whose counterparts we may see today. Mark Twain's Tom Sawyer and Huckleberry Finn are boys whose adventures have evoked sympathetic laughter from generations of readers.

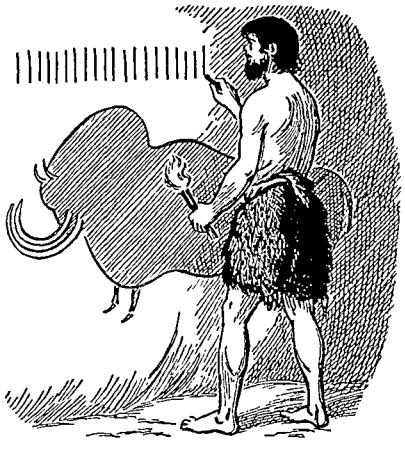
Satire differs from humor in that the fun it pokes is malicious and sometimes cruel. In 'Babbitt' Sinclair Lewis drew a satirical portrait of a narrow and self-important person and ridiculed his false standards and opinions. Mark Twain and Charles Dudley Warner collaborated on 'The Gilded Age', bitterly satirizing "get-rich-quick" ambitions.

The Values of Fiction

Whatever particular class a novel may fall into, it also must have certain general values for the reader. First of all the novel must entertain; it must absorb the reader's attention and interest. To do this, once the reader has granted the "willing suspension of disbelief," the story must seem real, no matter how remote or fantastic the elements of the story may be.

Some novels merely entertain; these are often classed as *escape* reading. A great novel does more. It can give us insights into the minds and characters of people that we rarely obtain in real life. It can emphasize great moral truths by dramatizing the consequences of good or evil action. In understanding the lives and actions of fictional people, we often end by understanding ourselves better.

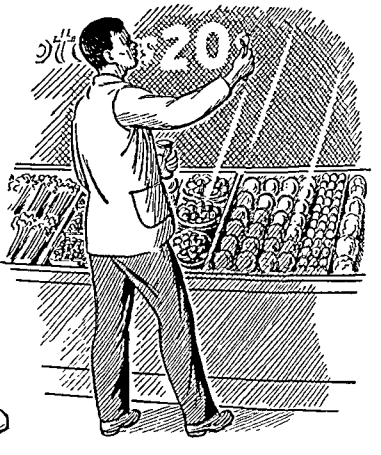
NOVEMBER. In the old Roman calendar November was the ninth month, as its name indicates, but it is now the eleventh owing to the change of the year's beginning from March to January. At the same time the number of days was increased from 29 to 30. It is said that the Roman Senate proposed to rename the month in honor of Tiberius, who succeeded Augustus as emperor; but he declined, saying: "What will you do, Conscript Fathers, if you have *thirteen* Caesars?"



Primitive people had no numbers. This man is scratching 20 tally marks.



The Romans grouped numbers by tens and wrote 20 as two tens (XX).



In our system, zero is a place holder. The 2 means 2 tens because of its place.

NUMBER—*The* BASIS *of* ARITHMETIC

NUMBER SYSTEM. The number system that we use today is one of a great many number systems invented in the past. This system has survived because it is more efficient than the others. The ways in which it is used in the four fundamental number operations are the products of the thinking of many people.

Number as such does not exist anywhere. The need for numbers probably grew out of people's desire to count things and to make records of their possessions. Pictures of groups of objects that undoubtedly were such records are found on the walls of caves. In some cases, notches cut in sticks, or tally marks scratched on stones or pieces of wood, served the same purpose. Some tribes of American Indians kept a record of their flocks of sheep by placing in a bag a pebble for each sheep. In none of these methods was any form of counting involved. Matching markers with objects was the basis of the record.

Later, people learned to use words, often parts of the body, to tell how many there were in small groups. Thus, the word for head was used to mean 1; the word for eye, 2; the word for hand, 5. In one tribe, the word for the middle finger was used as the name of the quantity 3.

Still later, methods of tallying small numbers of items on the fingers of the hand, or with groups of tally marks, crosses, and other symbols, were devised. For numbers not in excess of ten it was fairly easy to tally them on the fingers of both hands. When larger numbers were to be shown, the problem of grouping arose. It then became necessary to devise a method of showing how often a group of a given size

had to be repeated to show the desired number. For example, two hands would mean the same as two fives, or what we call "ten." This is a very simple form of grouping used to show small numbers.

The Roman Number System

Many systems of grouping have been invented. One of the best known is the Roman system. It provided for the larger numbers by using symbols to denote groups of different sizes, as follows:

I means 1	L means 50	M means 1,000
V means 5	C means 100	$\overline{V}$ means 5,000
X means 10	D means 500	$\overline{X}$ means 10,000

Repeating a symbol repeats its value. Thus III means 3, and XXXX means 40. The Romans did not repeat a symbol more than four times. The symbol V expresses five I's, L is equivalent to five X's, and D to five C's. The first letters of the word *centum* (hundred) and *mille* (thousand) were used as symbols for these numbers.

If a symbol of lesser value is written *after* one of larger value, its value is to be added to the larger symbol: thus VI means 5 and 1, or 6. If a symbol of lesser value is written *before* a symbol of larger value, its value is to be subtracted from the value of the larger symbol: thus IX means 1 less than 10, or 9. The total value of a large number is found by finding the sum of its parts: thus the number MCLXIV means 1,000 plus 100 plus 50 plus 10 plus 4 (one less than 5), or 1,164 in the system we use.

The Roman system evidently grew out of the use of tally marks to show numbers. Thus III is three tally marks, corresponding to three fingers, or *digits* (from the Latin *digitus*, meaning "finger"). X appears to consist of two V's, one of them inverted. Because the Roman system is built on tens, we call it a *decimal system* (from the Latin *decem*, which means "ten"). Clearly the number of fingers on the hands was the reason for choosing 10 as the basic number.

Principles Underlying Our Number System

The number system we use today also is a decimal system, built on tens. It was invented several thousand years ago by the Hindus in India and brought to Europe by the Arabs about A.D. 900. Because of its simplicity, the Hindu-Arabic number system had been adopted almost everywhere in Europe by the time Columbus discovered America.

The main characteristics of the Hindu-Arabic system are as follows:

The Ten Symbols. Any number can be written by using the ten symbols of the number series: 1, 2, 3, 4, 5, 6, 7, 8, 9, and 0. Each symbol indicates a value corresponding to its position in the number series. Thus 4 has the value of 4 things and it has a position in the number series after 3 and before 5. Such number words as "four" and "thirty" are names for the various symbols. The names are not the same in all languages, but the symbols are always written in nearly the same way and have the same meaning.

Value gives us *cardinal numbers*, which tell "how many." The words one, two, three, and so on are cardinal forms. Position gives us *ordinal numbers*, which tell order. The adjectives first, second, third, fourth, and so on, are ordinal forms.

Place Value. The value of a figure depends on the place in which it is written. Place value increases tenfold in going from right to left. Thus, in 111 the value of the middle 1 is ten, ten times the value of the 1 at its right. The value of the 1 at the left is 100, ten times the value of the 1 at its right.

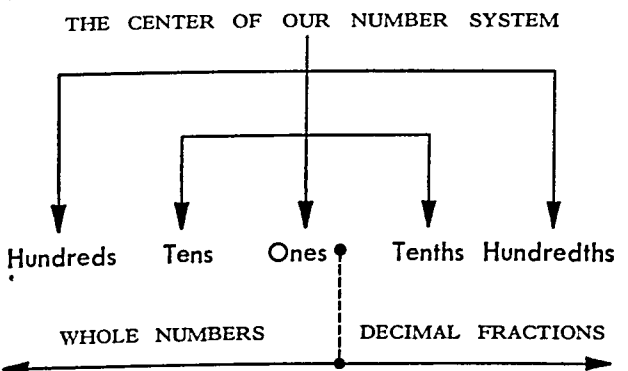
Zero. The Hindus were the first to use the symbol 0 (zero) to express the idea of none, or not any. In the number 302 there are no tens to write in tens' place. The 0 serves as a place holder in the tens' place, keeping the 3 in hundreds' place and the 2 in ones' place. If the 0 were not used to hold tens' place, the number would be 32, which is quite different. Without the zero the values of the 3 and the 2 would need to be expressed as 3 hundreds and 2 ones or, as in the Roman system, CCCII.

The usefulness of the Hindu-Arabic number system as compared with the Roman can be shown by working these addition examples.

MDVIII	1,508
+ CCLIX	+ 259
MDCCLXVII	1,767

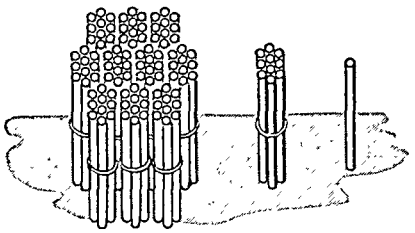
For ease in reading large numbers, the figures are grouped by commas into periods of three figures each, counting from the right. Thus, in the number 432,689 the three figures in the second period, 432, are written in what we call the thousands' period. They are read: four hundred thirty-two (432) thousand. In still larger numbers, periods to the left of thousands are named, in succession, millions, billions, trillions, quadrillions, quintillions, sextillions, septillions, octillions, nonillions, decillions, and so on.

Because 12 can be divided without a remainder by more numbers than can 10, a number system with 12 as a base would have some advantages over our decimal system. The 12-scale is called *duodecimal* from the Latin word *duodecim* (twelve, or dozen). There has always been some use of the 12-scale for certain purposes. Thus, we divide the foot into 12 inches,

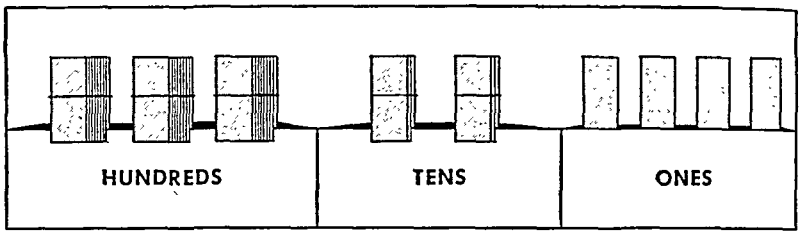


This diagram shows how the places to the right and to the left of ones' place (the center) are related. The decimal point in a number tells where the whole number ends and the decimal fraction begins. Notice that the tens are written one place to the left of ones' place, while tenths are written one place to the right of ones place.

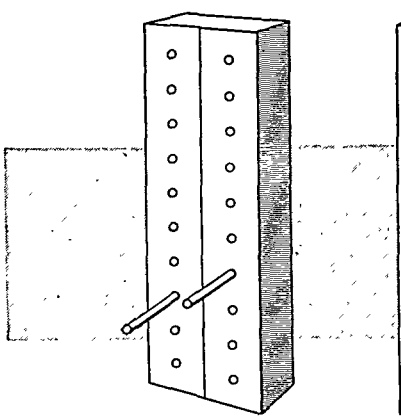
DEVICES FOR TEACHING THE MEANING OF PLACE VALUE



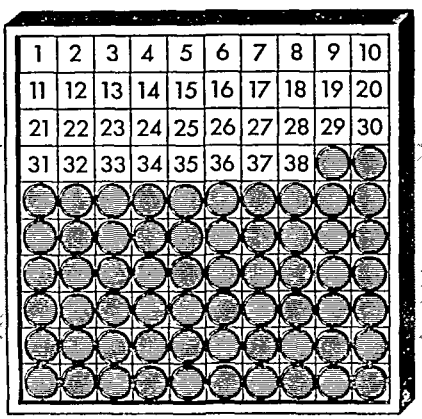
These sticks, single and in bundles, make clear the differences in quantity of 100, 10, and 1. The 10 bundle consists of 10 single sticks (ones). The 100 bundle consists of 10 smaller bundles of 10 sticks each (tens). The total value of the sticks shown in the picture is expressed by the number 111. The meaning of the number 24 would be shown with 2 tens' bundles and 4 single sticks.



Place-value pockets are an excellent device for teaching place value. They are useful also for regrouping in working examples. Pockets like those shown can easily be prepared. Each pocket should be properly labeled. The cards represent numbers. The ones' pocket is for single cards. In the tens' pocket are bundles of 10 cards, each bundle held together by a rubber band. The bundles in the hundreds' pocket are made up of 10 smaller bundles of 10 cards each. The meaning of 324 is shown with 3 hundreds' bundles in the hundreds' pocket, 2 tens' bundles in the tens' pocket, and 4 single cards in the ones' pocket. For carrying, in addition, 10 ones or 10 tens can be bundled and moved to the left. For regrouping in subtraction, a bundle can be separated and moved to the right.

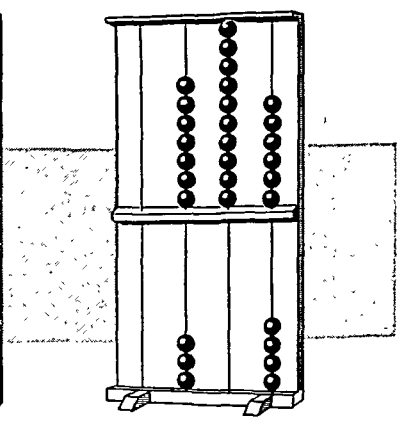


This is a two-column peg board, or counting board. The pegs show the number 34 as 3 tens and 4 ones. The tens' peg is in the third hole from the bottom in the left-hand row, the tens' row. The ones' peg is in the fourth hole in the right-hand row, the ones' row. Any two-place number can be shown in a similar way with this board.



1	2	3	4	5	6	7	8	9	10
11	12	13	14	15	16	17	18	19	20
21	22	23	24	25	26	27	28	29	30
31	32	33	34	35	36	37	38		

The hundred board can be used to show the meaning of any number up to 100. The board consists of 10 rows of 10 squares each. To show the meaning of 38, the child covers with disks all but the three top rows (3 tens) and 8 in the fourth row (8 ones), leaving in all 38 squares uncovered. The child sees that 38 is made up of 3 rows of tens and 8 ones.



This type of abacus is used in schools to demonstrate place value. The beads in the lower part show the meaning of 304. Each rod represents a place in a number. Here we have 3 beads on the hundreds' rod, 0 beads on the tens' rod, and 4 beads on the ones' rod. If one bead were moved down on the tens' rod, the abacus would then show the number 314.

the clock into 12 hours, the day into 24 hours, and the circle into 360 degrees.

Steps in Learning the Number System

Young children usually learn to count small groups of objects before they enter school. They like to count people, coins, toys, dishes, candies, and other objects with which they come into contact in their activities. Counting objects makes numbers meaningful. Rote counting, as in repeating rhymes or repeating numbers serially, is of little value in establishing the meaning of numbers. Under sympathetic family guidance, children may learn much in the home about the use of numbers (*see* Arithmetic).

When they first enter school, many children can count by rote to 100 and can count people or things up to about 20. Some of them can give the answers to simple problems, such as 3 and 2 or 5 less 1. Few of them can read or write any numbers. In the primary grades, class activities give children many opportunities to count small groups of things and to write the numbers as records of their experiences.

The need for reading numbers arises in many situations, both in and out of school. For example, a child needs numbers to find a specific page of a book, to read the calendar, to tell time, to dial on the radio or telephone, and to find a house number. Hundreds of similar situations are encountered by the young child. Later, children learn to read fractions and to understand the fractional divisions on rulers and scales. Still later they learn to read decimal fractions.

The meaning of place value in numbers is taught with the addition and subtraction of whole numbers. For teaching place value, such devices as those illustrated on this page are commonly used. The place-value pockets can be used also to show carrying in addition and multiplication and regrouping in subtraction and division. (*See also* Arithmetic; Addition; Subtraction; Multiplication; Division.)

Fractions, Decimals, and Advanced Arithmetic

We have seen that the Hindus devised a number system in which whole numbers are written with

ten different figures and in which use is made of the principle of place value to give meaning to the numbers. Next, *fractions*, such as $\frac{1}{2}$ and $\frac{1}{4}$, were added to our number system to express amounts that are less than one whole. The same ten numbers that are used in writing whole numbers are used for fractions. We can say that fractions are an addition to our number system, requiring the use of the figures in a new way.

To learn the meaning of such fractions as $\frac{1}{2}$ and $\frac{1}{4}$, the fractional parts should first be shown with objects such as apples, pies, or circles. Then the fractions should be shown in a variety of ways with pictures or drawings. Finally, the ways of expressing fractional parts with figures should be learned. (*See* Fractions.)

Within the last few hundred years, the use of *decimal fractions* has been introduced. In industry and business the use of decimal fractions has increased rapidly because computations are easier to make with decimal fractions than with common fractions. Decimal fractions are also easier to print (*see* Decimals; Percentage.)

In advanced arithmetic and other forms of mathematics we find numbers such as 4^2, $\sqrt[3]{27}$, and -6. One reads 4^2 as "4 squared," which means 4×4. The other expressions are read as the "cube root of 27" and "minus 6." (*See* Powers and Roots; Algebra.)

NUREMBERG, GERMANY. Until the second World War Nuremberg was so picturesque that it was called the "storybook city." Within it stood the walled Old Town built in the Middle Ages. Massive stone ramparts, topped by fortified towers, guarded the medieval Gothic churches and gabled houses of the Old Town. During the second World War, Allied bombing raids almost leveled Nuremberg, and virtually all the medieval Old Town was shattered.

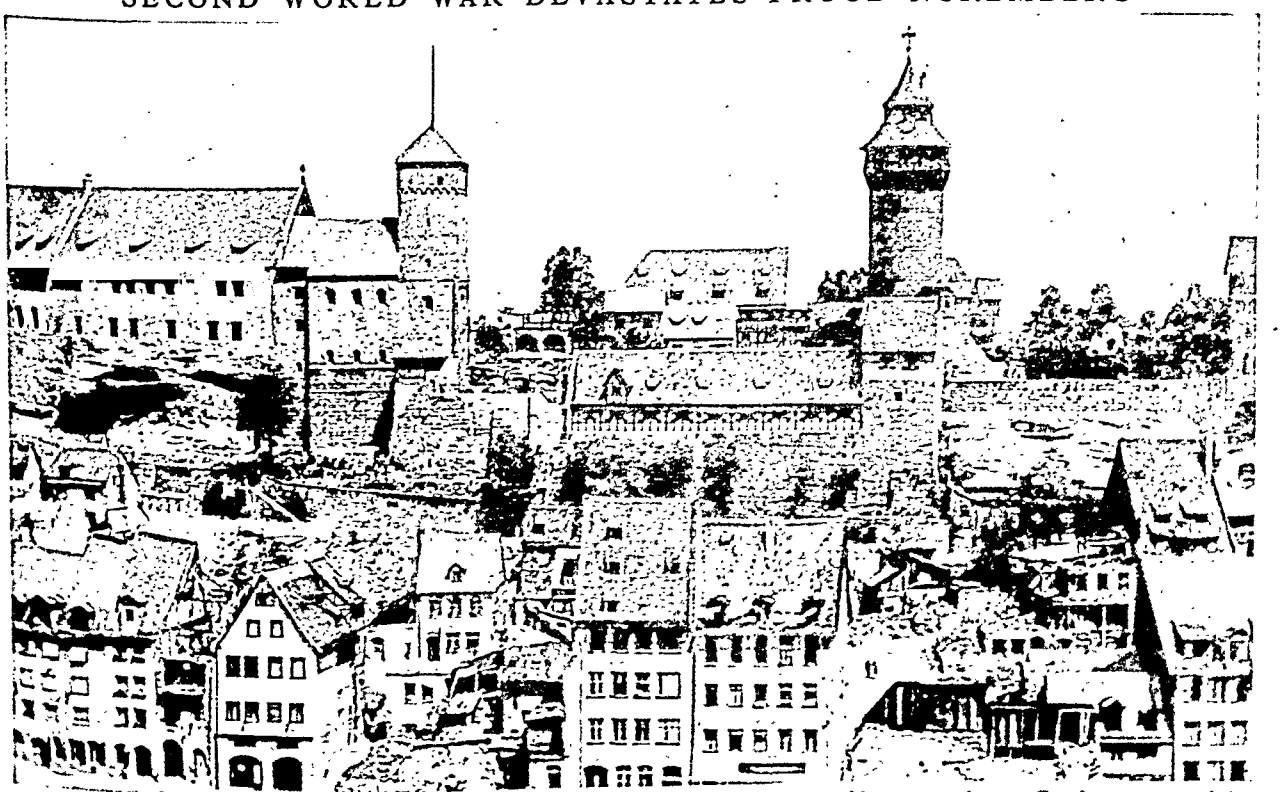
Nuremberg (Nürnberg in German) then began to rebuild from the rubble, for it is one of the chief commercial centers of Germany. It stands on the Pegnitz River, a small tributary of the Main River, amid the woods and sandy farmlands of southeastern Germany. Its location gives it control of routes to the Danube. Since medieval times the city has been a crossroads for trade between Germany, Italy, and Austria. Today it has a commanding position on the Rhine-Danube canal. A network of railroads and highways enlarges its facilities as a distribution center.

The city traces its beginning to a castle built on a rocky height over the Pegnitz in the 11th century. Protected by the castle, merchants and artisans built homes and shops in the valley. The artisans became famed throughout Europe for the skill and beauty of their carvings, woodworking, and painting. In 1219 proud, flourishing Nuremberg became a free city.

The city's artistic importance mounted in the 16th century through the work of Albrecht Dürer, a great painter and engraver (*see* Dürer). With his companion artists in the "Nuremberg school," he made the city the "home of German arts." About the same time Hans Sachs, the cobbler poet, became leader of the *Meistersinger*, or Mastersingers (*see* Music).

As the city grew beyond the old medieval walls, it developed light industries. In the 19th century it

SECOND WORLD WAR DEVASTATES PROUD NUREMBERG



This is one of the less damaged parts of Nuremberg, Germany, after Allied bombing raids on war plants. Garrison towers of the medieval Old Town stand scarred above tall, peaked houses of a newer section of the city. Nuremberg is still rebuilding.

specialized in toys, carvings, and fancy metal ware. Mellow Nuremberg changed in the 20th century after Adolph Hiter, in 1933, made it the Nazis' "pageant city." He built a vast stadium for the annual Nazi Congress. There in 1935 the Nazis announced their anti-Semitic decrees, or "Nuremberg laws." They converted the city's industries into armament manufactures. These war plants led to the Allied bombing of Nuremberg in the second World War. After the war the battered city was the scene of the Nuremberg trials for German war criminals (*see* Germany). *Population (1950 census), 362,459.*

NURSING. The art of ministering to the sick and helpless is older than medical science itself, but systematic training for this work is of comparatively recent origin. During the Middle Ages some religious organizations were especially dedicated to the care of the sick. Their members were taught simple nursing methods learned by generations of practical experience. The Sisters of Mercy is among the many religious orders today devoted to hospital work. But it was not until the pioneer efforts of Florence Nightingale that nursing was recognized as an independent technical profession (*see* Nightingale, Florence). In 1872 the first class of scientifically trained nurses was graduated in the United States.

Standards of nursing education and service have advanced steadily since that time. Today a girl must be a high school graduate to enter a reputable hospital nursing school (*see* Hospitals). She must pass a rigorous physical examination, and may undergo intelligence and aptitude tests as well. She pays tuition fees ranging from $40 to $300 for the three-year course, but receives board, lodging, and laundry free. She enters training as a "probationer" and must further prove her fitness for the work during a three- to five-month period before she receives the starched white cap that is the symbol of her status as a student nurse. She attends prescribed classes in such subjects as anatomy, physiology, and the basic principles of medical practise taught by physicians and surgeons on the hospital staff. She studies the techniques of nursing under graduate nurse instructors. She is on duty about eight hours each day in the hospital wards and rooms, practising the theory she has learned and becoming increasingly expert in the care of the sick. After completing the three-year course with a good record she receives a diploma in nursing.

The next step is to pass the state board examinations and be registered as a qualified nurse, entitled to write R. N. ("registered nurse") after her name. These letters represent the state's assurance to the patient that the nurse has met its requirements for the practise of her profession. States also set up minimum standards for nursing schools.

A nurse may go into "private duty" caring for the sick in their homes or in hospitals, or she may enter the employ of a hospital, sanitarium, or similar institution. Here she may advance to a number of special posts, including those of operating-room nurse, anesthetist, dietitian, X-ray technician, orthopedic therapist, instructor, head nurse, and superintendent of nurses. She may enlist as an army or navy nurse with an officer's commission and pay. She may join the Red Cross Nursing Service or Veterans' Administration Service. Public health nursing calls many nurses to a variety of tasks. The largest number of women in this field are visiting nurses, but many rise to administrative positions. Training in nursing may also lead to a job as an assistant to a physician or dentist, as an industrial nurse, a school nurse, or a stewardess on trains or airplanes.

The better positions usually call for advanced training. An increasing number of colleges and universities have opened schools of nursing where, in addition to completing the hospital training required for a nursing diploma, students may take a year or more of supplementary work entitling them to academic degrees. Many universities also offer post-graduate courses in special branches of nursing.

The American Nurses' Association and the National League of Nursing Education, both with headquarters in New York City, have led the movement toward higher professional standards. Girls who are interested in taking training may write to one of these organizations for information and advice. These associations stress the fact that nursing is an exacting profession the chief rewards of which go to the "better than average" nurse. They stress the need for such qualities as physical stamina, emotional steadiness, alertness, tact, self reliance, and the ability to coöperate with others.

Many high schools offer classes in home nursing to prepare girls to care for members of their families (*see* Home Economics). The American Red Cross also conducts short courses in home nursing for adults. The Red Cross sponsors the training of Nurses' Aides who serve in hospitals as volunteers when wars or other emergencies bring a shortage of nurses. Following 80 hours of classroom and ward training, aides must give 150 hours' hospital service each year.

TWO FEATHERED GYMNASTS



The nuthatch is an expert gymnast. He can hop head first down a tree trunk quite as easily as he can hop up it, for he is furnished with sharp claws, well adapted for holding rough bark.

NUTHATCHES AND CREEPERS. Nuthatches resemble chickadees in their topsy-turvy search for the insects and grubs hidden in the bark of trees. With their sharp, curved claws they scramble busily up and down tree trunks and around branches, upside down more often than not, pausing occasionally to study a human intruder with friendly curiosity. The name nuthatch refers to their habit of forcing soft-shelled nuts into the crevices of trees, and then

SERVICE IS THE KEYNOTE OF THE NURSING PROFESSION



1. Lectures and study are an important part of every nurse's training. 2. Powdering surgical gloves so that they will slip on easily is one of the student nurse's many duties. The gloves are sterilized before use. 3. Student nurses learn to operate huge sterilizers like this one. 4. Nurses on duty in a hospital nursery take every precaution to keep germs from new-born babies. 5. This picture shows the ward of a United States Navy hospital ship. Many trained nurses enter the army or navy.

hammering them open with their bills. They are smaller than English sparrows, with bluish-gray and white backs, white or reddish-brown breasts, and short, square tails. They nest in the forests of northern Canada. The nest is usually placed in a hole of a dead tree. In the winter they scatter throughout the United States, often traveling in the company of chickadees and downy woodpeckers, with whom they seem to be on the best of terms. In the northern states, where bird calls are rare in the winter, their loud, nasal *yank! yank! yank!* is a welcome sound.

The creeper is a modest little brown bird with a dull white breast. Unlike the nuthatch, it hunts for its insect food by going around tree trunks spirally from bottom to top, always keeping an upright position, and using its spiky, sharp-pointed tail for a brace, as the woodpeckers do. The common call of the creepers is a thin *screek*. They spend the summer in the evergreen forests of southern Canada and the mountains of western United States. They build their nests behind the loose bark of old trees. In the winter they spread throughout the United States.

Both the nuthatches and the creepers are Old World families, extending across the northern parts of Europe and Asia. Only four species of nuthatches and one species of creeper occur in the Western Hemisphere.

Scientific name of the nuthatch family, *Sittidae*. The white-breasted nuthatch (*Sitta carolinensis*) is an eastern species, ranging west to Manitoba and eastern Texas. The red-breasted nuthatch (*Sitta canadensis*) extends across the continent and from the upper Yukon Valley to southern California. The brown-headed nuthatch (*Sitta pusilla*) is found in the coastal pine belt of the southeastern states. The pigmy nuthatch (*Sitta pygmaea*) lives in coniferous forests of western North America and Mexico.

Scientific name of the creeper family, *Certhiidae*. The one species in the United States is *Certhia familiaris*. It is divided into five very similar subspecies: the brown creeper of the eastern states, and the Rocky Mountain, Mexican, Sierra, and California creepers of the West. The so-called "black and white creeper" is a warbler. (For illustrations in color, *see* Birds.)

NUTMEG AND MACE. The fragrant spice we call nutmeg is the seed of the nutmeg tree. From the fruit of this tree is also obtained mace, another popular spice which has a characteristic flavor of its own, quite unlike that of nutmeg. "The nutmegs must be able to smell the sea and the cloves see it," is an old saying. Most of the plantations of this tropical tree are in the East Indies (Indonesia), the British West Indies, and on the island of Penang off the west coast of the Malay Peninsula.

There are about 80 species of nutmeg trees and shrubs. The most common (*Myristica moschata*) is a handsome evergreen with straight trunk about 25 feet high covered with branches from base to tip. The flowers are small and yellow, with a perfume like lilies of the valley.

Nutmeg trees bloom and bear in continuous succession the year round. When a crop is ripening, the trees are bright with yellow fruit about the size and shape of pears. In the wind, the dark, glossy five-inch leaves seem lined with silver, and the air that stirs them carries away a fragrance that is indescribably sweet.

When the fruit is ripe the fleshy outer husk is removed. Preserved in syrup, the fleshy husk is a favorite delicacy in the East Indies. Under this husk is the lacy scarlet fiber known as mace. Inside this fiber in turn comes a thin shell which encases the familiar nutmeg of commerce, about an inch long and irregularly ridged.

The mace is stripped from the nuts and both mace and nuts are fire-dried and sun-dried for more than a month. At the mills the mace is finely ground. Sound nutmegs are usually exported whole to retain their flavor. Inferior nuts are ground, and the oil is extracted to make "oil of mace" or nutmeg butter.

For many years the Banda Islands in the Molucca group have been specially famous for the quality of their nutmegs and mace. This is credited to the skill and patience of the plantation workers in preparing the spices for market.

The legend that shrewd Connecticut merchants used to fashion pieces of wood to resemble nutmegs, then flavor them with the spice and sell them as genuine, is said to have originated with the Canadian humorist Thomas Haliburton, who wrote under the name of "Sam Slick."

NUTS. Many primitive peoples who had not yet learned to catch fish, hunt game, or till the soil subsisted chiefly on roots, berries, and nuts. Of these, nuts were the most concentrated and nourishing, for they are especially rich in oil and protein. Furthermore, the nut meats were preserved inside airtight shells and could be kept to be eaten through the long cold winters when other foods were unavailable.

Today only a few nuts are of much importance as food, but a constantly growing number provide materials useful in industry. A true nut has a hard shell; it does not split open when ripe; and the kernel or meat is in one piece. *Walnuts, pecans, butternuts, hazelnuts* or *filberts, hickory nuts, beechnuts, acorns* and *chestnuts* are among the true nuts in the botanical sense (*see* Walnut; Pecan; Butternut; Hazel; Hickory; Beech; Oak; Chestnut). But in the popular sense, many other fruits and seeds are called nuts, including the *peanut* which belongs to the pea family; the *almond* and the *coconut* which are drupes or stone fruits (*see* Peanut; Almond; Coconut Palm).

One of the most delicious is the *Brazil nut* which grows in Brazil and other parts of tropical South America and in French Guiana. These three-sided nuts grow in clusters of from 14 to 28, tightly packed inside a great hard round shell, the color of a coconut and as big as a man's head. When the nut is ripe, it crashes to the ground, and since the trees are a hundred or more feet high, it is best to stay out of range. Oil from the Brazil nut has medicinal properties and is also used for lubrication and lighting; the husk provides a kind of oakum for calking ships.

Pistachio nuts are oily and have a distinctive aromatic flavor. Their pale green kernels are enclosed in a thin two-parted shell. They are seeds of a tree native to Asia Minor.

The queer kidney-shaped *cashews* have long been very popular. Cashew trees flourish on land unfit for

farming and where other trees could not exist. India is the chief producer and processor of cashews. In addition to its own large crop, India imports cashews from South Africa and Portuguese East Africa, roasts them in oil and salts them, then ships 84 per cent to the United States, its chief customer. The shell of the cashew is a valuable source of oil used in swift-spinning mechanisms, such as magneto armatures.

Tung nuts of China, now raised extensively in several Southern states, contain an oil used in the manufacture of paints and varnishes (*see* Paints and Varnishes). From the meat of west Africa's *palm nuts* is expressed an oil used in soapmaking; the endosperm is a source of oil for coloring imitation butter. The edible *cohune nut*, from a palm of Honduras, also supplies a lather-producing oil. When the soap oil shortage occurred during the second World War, Brazil's rich-lathering *babassu nut*, hardest nut in the world, became extremely important in soap manufacture. Other sources of oil are the *dika nut*, which is the seed of a west African mango tree, and the *pine nuts* of Europe and America (including the edible *piñon nut* of southwestern United States.)

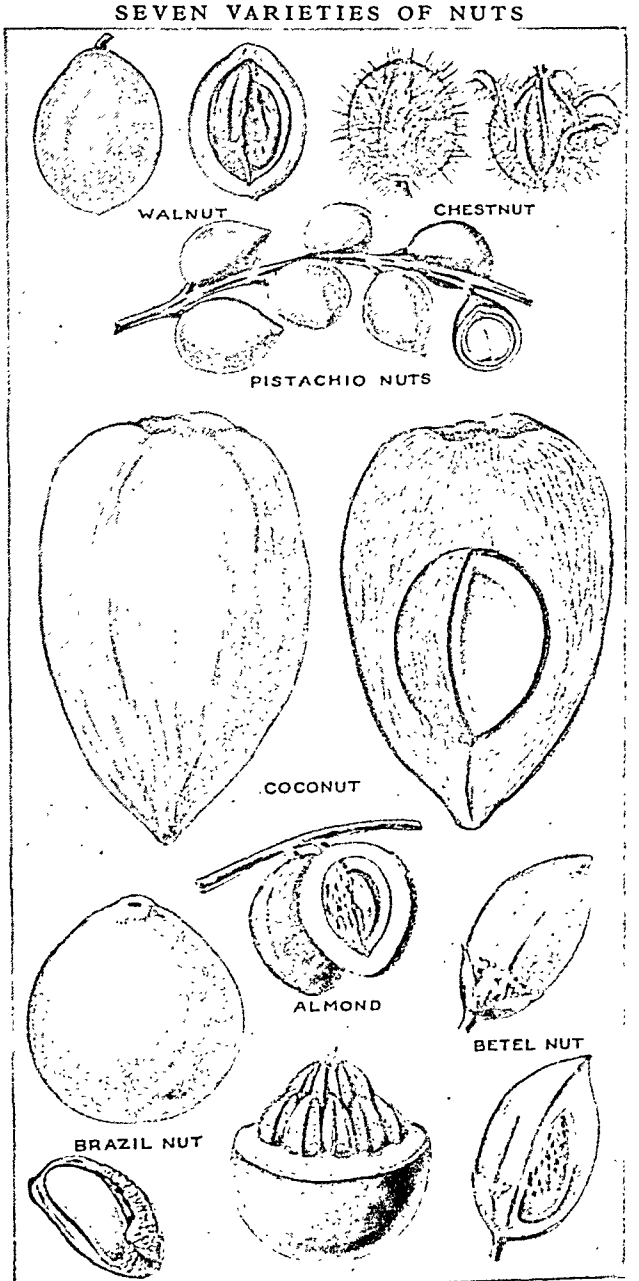
The *candlenut*, found throughout the tropics, is one of the most versatile of all nuts. It can be lighted and used like a candle. A purgative oil can be squeezed from its raw meat. If roasted, it is a good food for men and cattle. *Gru-gru nuts* of South America and the West Indies yield a violet-scented oil used in soapmaking. Necklaces made of them keep their fragrance for many years. Brazil's *cumara nut* supplies an oily perfume.

Buttons are made from the "vegetable ivory" obtained by drying the kernels of the *tagua* or *corozo nut* and of the *coquilla nut*, both of South America. This vegetable ivory is exceedingly hard and can be sawed, carved, turned on a lathe, colored, and polished (*see* Buttons). Oil from the fresh kernels is a good substitute for coconut oil in soapmaking.

The Chinese *litchi nut* has inside its brittle shell a meat that resembles a strawberry when fresh and a raisin when dried. *Betel nuts* are chewed as a narcotic by East Indians (*see* Betel). *Cola* or *kola nuts*, native to Africa and cultivated elsewhere in the tropics, contain much caffeine and are used as a basic ingredient in our familiar cola drinks.

A comparative newcomer to the American market is the *macadamia nut*. Native to Australia and now grown commercially in Hawaii, the macadamia has an individual and delightful flavor.

SEVEN VARIETIES OF NUTS



These nuts are shown whole and also cut open. Notice the many Brazil nuts packed together inside an outer shell.

NYLON. The coined name given to a whole family of chemical compounds is nylon. These compounds can be formed into fibers, bristles, sheets, rods, powders, and liquid coatings. Nylon's final products are many. They range from sheer hosiery and delicate lace to stiff brush bristles and molded bearings for machinery.

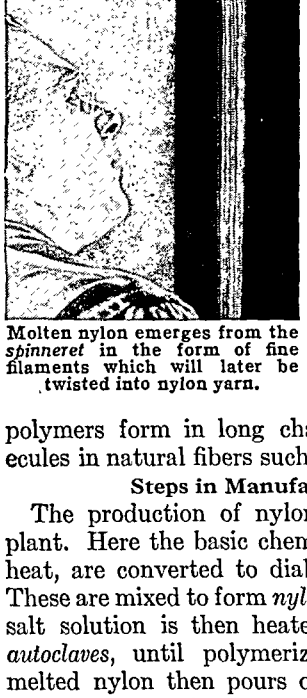
Nylon has somewhat the same chemical composition of natural protein fibers, such as hair, silk, and wool. But nylon is different in many ways from any natural product. For example, nylon yarn is superior in strength, wearing quality, and ability to hold shape.

The Chemical Basis of Nylon

Nylon is a product of a chemical process called *polymerization*. In this reaction the molecules of one chemical unite with those of another to form larger molecules. This process can continue until giant molecules, or *superpolymers*, are formed. Nylon is a superpolymer.

The giant molecules which make up nylon are formed when a diabasic acid and an organic diamine are heated together. There are many chemicals classed as diabasic acids and many others as organic diamines. Thus, hundreds of nylon compounds have been made,

NYLON FILAMENTS



Molten nylon emerges from the *spinneret* in the form of fine filaments which will later be twisted into nylon yarn.

and many thousands of others are possible.

It is often said that nylon is made "from coal, air, and water." This is true only of some nylon compounds, such as that for nylon yarn. The diabasic acid comes from benzol or phenol (obtained from coal) and oxygen (from air). The diamine is made from ammonia, created by combining hydrogen (from water) with nitrogen (from air). This formula is chosen for nylon yarn, because the superpolymers form in long chains, like the giant molecules in natural fibers such as silk, cotton, and wool.

Steps in Manufacturing Nylon

The production of nylon begins in an ammonia plant. Here the basic chemicals, under pressure and heat, are converted to diabasic acids and diamines. These are mixed to form *nylon salt.* This concentrated salt solution is then heated in huge kettles, called *autoclaves,* until polymerization takes place. The melted nylon then pours over a giant casting wheel. A swift spray of cold water turns the molten ribbon of nylon into a hard sheet. The sheet is then chopped into small flakes called *nylon chips.*

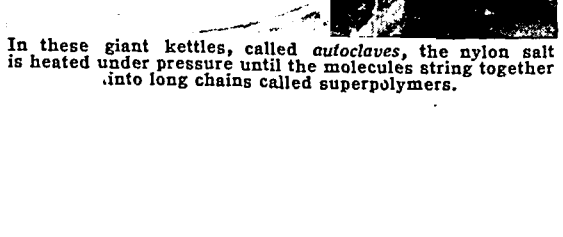
If the nylon is intended for sheets, rods, bristles, coatings, or molds, it is sent to factories in the form of chips. The chips are melted and then manufactured into final products. But nylon intended for yarn must take further treatment. The chips are melted and the solution filtered. The molten nylon is then pumped through a *spinneret.* This is a metal disk containing as many fine holes as the number of filaments, or single threads, desired in the finished yarn. The filaments form as soon as they strike cool air outside the spinneret, and are twisted loosely together and wound on bobbins.

The next step is stretching the yarn. The yarn is run through rollers until it has been pulled to four or more times its original length. Before stretching, the long-chain molecules were arranged haphazardly, like spilled matches. But now they realign themselves tightly and neatly along the length of the yarn. The stretching increases strength, elasticity, and makes the yarn lustrous. "Throwing" follows stretching. The yarn is twisted tightly, and coatings of oil and finishing materials are added to make the nylon easier to handle in weaving. Finally the yarn is wound on bobbins and sent to textile mills for weaving.

Nylon was the result of research into the nature of polymerization. The research was sponsored by E. I. du Pont de Nemours and Co., Inc., and was led by Dr. W. H. Carothers. By 1935 the first synthetic superpolymer was produced. The manufacture of nylon as a bristle for toothbrushes was announced in 1938. Two years later the first nylon stockings were marketed. In 1949 the same company brought out *orlon,* a companion product. Orlon is stronger and more resistant to heat and chemicals than nylon. It does not take dyes well, however, and cannot be woven into such delicate forms.

German textile producers began shipping *perlon,* a type of nylon, into the United States in 1952.

WHERE POLYMERIZATION TAKES PLACE



In these giant kettles, called *autoclaves,* the nylon salt is heated under pressure until the molecules string together into long chains called superpolymers.

NYMPHS. To the imaginative Greeks of ancient times all the seas, streams, fountains, caves, hills, and woods seemed peopled with divinities. The fair young goddesses who presided over various parts of the world of nature were called nymphs. In the limpid springs, fountains, brooks, rivers, and lakes dwelt the Naiads, beautiful water nymphs. The Oceanides (daughters of Oceanus) were nymphs of the great sea which was believed to surround the whole earth. The Nereids were the nymphs of the Mediterranean. Clad in their flowing green robes, they might be seen dancing over the waves. Thetis, the mother of Achilles, was a Nereid.

The Oreads, or mountain nymphs, represented as tall graceful maidens, were the constant companions of Artemis, the goddess of the hunt. The unfortunate Echo, who pined away for love of Narcissus, was an Oread. The Napaeads, the shiest of the nymphs, dwelt in the valleys. Every tree was believed to have its own nymph, called a Dryad or Hamadryad, who was born when the tree began to grow, dwelt in it, suffered if it was mutilated, and sickened and died when the tree perished. Although the Dryads were mortal like human beings, they remained young while they lived.

OAK

OAK. Strong and long-lived, the majestic oaks reign as monarchs of the forest. It takes a hundred years for most of these sturdy trees to reach maturity, and some specimens are known to be a thousand years old.

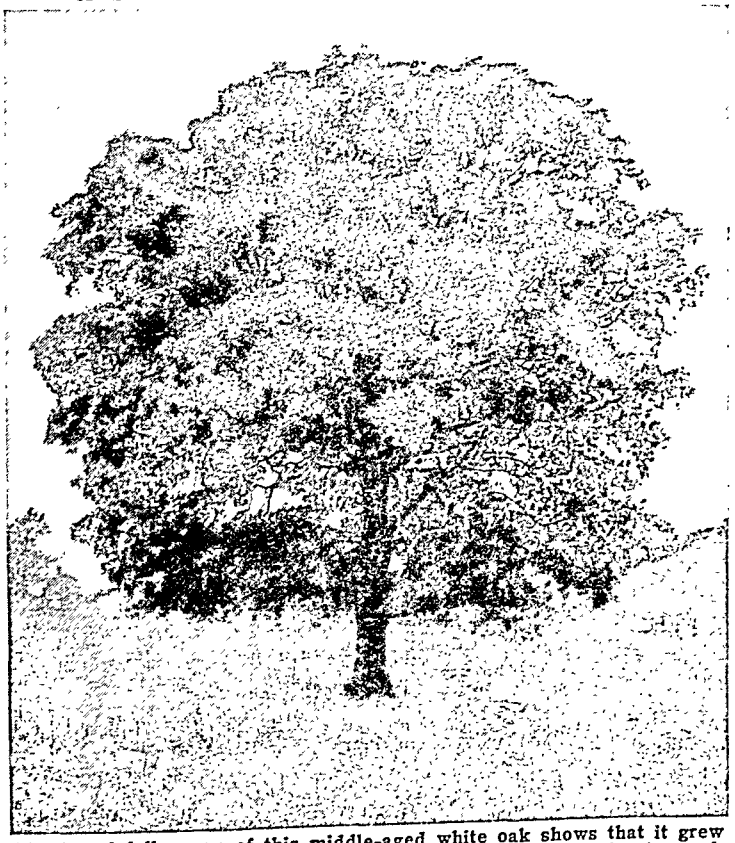
Oaks range in size from shrubs to giants 150 feet high. The trees have thick trunks and large, wide-spreading branches. The leaf is usually deeply toothed, but in some species is almost smooth at the edge. Oaks vary widely in appearance but they are easily recognized by their peculiar fruit, the acorn, a round nut set in a woody cup. The Indians and the early settlers of New England boiled and ate the acorns of the white oak. Hogs feed on acorns, and squirrels and some birds store them away for winter food.

Oaks are widely distributed throughout the temperate zone of the northern hemisphere, and a few species are found in high altitudes in the tropics. Of the 200 or more species known, about 75 are native to the United States.

One of the best known species in the eastern United States is the white oak, a stately tree which reaches a height of from 70 to 100 feet. The leaves are large and deeply lobed, light green above and whitish beneath. In autumn the foliage turns deep violet and clings to the tree throughout the winter, falling when the new leaves appear. Such clinging leaves are characteristic of many oaks. The trunk, which often reaches a diameter of three to four feet, is covered with whitish furrowed bark, which gives the tree its name. The large egg-shaped acorns are set in bowl-like cups with warty scales. Because of its spreading top the white oak is an excellent shade tree.

The bur or mossy cup oak is another well-known and valuable American species. This hardy, beautiful tree sometimes towers to a height of 150 feet, though its average height is about 75 feet. Its deep green leaves are very large, sometimes measuring from ten inches to a foot in length, deeply lobed at the lower part and rounded at the apex. The acorns are exceptionally large, and are set in rough cups with a noticeable fringe about the edge. The bark is brownish-gray and furrowed. The bur oak is comparatively rare east of the Alleghenies, but it is found from Pennsylvania to Montana and south to Texas. It grows largest in the lower Ohio Valley.

A STURDY OAK OF THE OPEN SPACES



The broad full crown of this middle-aged white oak shows that it grew up in a clearing, unshadowed by neighbors. Forest oaks, having to reach upward toward the sun, grow taller and more slender.

The red oak, one of the most beautiful of American oaks, presents a picturesque appearance in all seasons. The round solid top is covered with large sharply lobed leaves, which are pink and furry in the spring, green in summer, and deep purple-red in autumn. The bark is dark brown, thick, and furrowed. The red oak also bears large acorns set in shallow cups.

The pin oak is a quick-growing medium-sized tree with deeply cut leaves, brilliant in autumn. The trunk and larger limbs are studded with tough branchlets which probably account for the name. This tree grows in the eastern United States, usually on moist lowlands.

The chestnut oak (also called the chinquapin), although possessing the main characteristics of the oak family, is conspicuous on account of its chestnut-like leaves; these are serrated or "saw-toothed" instead of deeply lobed. The tree is tall and stately, with stout trunk and limbs. (*See* Chinquapin.)

The live oak is a beautiful southern tree that sometimes rises to a height of 60 feet. Its branches are spreading and graceful, covered with small glossy evergreen foliage. It is rarely found more than 50 or 60 miles inland from the Gulf of Mexico.

The well-known British oak is the largest and most valuable of all the oak trees and is celebrated in myth and history. This tree is a veritable giant, with

sturdy limbs and enormous girth. The peculiar zigzag growth of the limbs in older trees gives them a twisted appearance which gives rise to the phrase, "the gnarled British oak," and adds to the picturesque appearance. This kingly tree lives to a great age, and some fine specimens which are still standing in England date back to the Anglo-Saxon period. This species is gradually being introduced into North America.

"TALL OAKS FROM LITTLE ACORNS GROW"



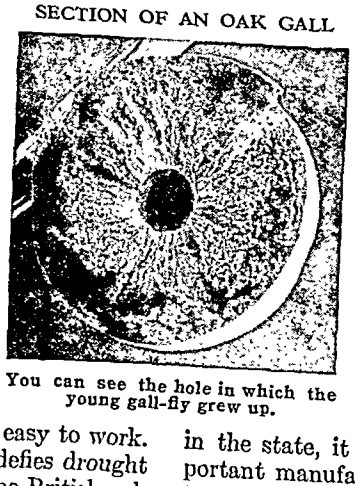
This picture shows the furrowed bark of the White Oak and the serrated leaf, with its many fingers, characteristic of all oaks. The acorns, singly or in pairs, grow from the stems. They are held fast in their cuplike husks until ripe.

A fungus disease is threatening to wipe out these magnificent trees. Oak wilt, known to scientists as *Chalaria quercina*, is caused by wind-blown spores which block the water channels in the tree. All types of oaks are affected. The center of infection is the Middle West. From there the disease is spreading east and south at the rate of about 50 miles a year. No effective control has yet been found.

The value of oak timber varies with the species. British oak is tough, hard, close grained, and comparatively easy to work. It excels most wood in durability. It defies drought and moisture. Bur oak ranks next to the British oak in importance. It is used for shipbuilding and manufacture. The bark being rich in tannin is used for tanning leather. The timber of the white oak is adapted to the same purposes as that of the preceding trees, though it is slightly inferior. The Southern live oak produces strong yellow wood which is difficult to work; it is highly valued for shipbuilding, being very durable under water. The timber of the red oak has little commercial value, being very porous, but it is useful for making cask staves; its bark also is used for tanning. The chestnut oak yields good timber.

The galls or "gall-nuts" so frequently found on oaks are produced by gall-flies, which lay their eggs in the tissues of the trees. The tissues swell up at the point of puncture and form firm nutlike structures inside of which the young of the insects develop to maturity. Each kind of gall-fly produces a different kind of gall, the ones commonly responsible being wasps of the group *Cynipideae*. Oak galls are rich in tannic acid used in making ink and for the preparation of leather. Those still containing the insect are best.

SECTION OF AN OAK GALL



You can see the hole in which the young gall-fly grew up.

Scientific name of the British oak, *Quercus robur*. The white oak is *Quercus alba;* its range is from Maine to Minnesota and southward, flourishing best on the slopes of the Alleghenies. Bur oak is *Quercus macrocarpa;* range from Pennsylvania to Montana and south to Texas. Live oak, *Quercus virginiana* (also *Quercus virens*); range, Southern states. Red oak, *Quercus rubra;* range from Maine to Minnesota and southward. Pin oak, *Quercus palustris;* range from Massachusetts to Delaware, south to Arkansas. Chestnut oak, *Quercus acuminata;* range from Vermont to Alabama and westward.

OAKLAND, CALIF. Commanding the mainland rim of the great harbor of San Francisco Bay stands busy Oakland. The third largest city in the state, it is a thriving port as well as an important manufacturing center. Several western and transcontinental railroads and air lines and a network of highways link Oakland with near-by and dis-

OAKLAND, CALIFORNIA'S GREAT MAINLAND CITY ON THE BAY



Oakland, California's third city in size, spreads over many square miles along the eastern shore of San Francisco Bay. Residential areas surround the business district near salt-water Lake Merritt in the heart of the city. Looking westward, is the world's longest bridge, San Francisco-Oakland Bay Bridge. In the distance are the lofty Golden Gate Bridge and the Pacific Ocean.

tant cities. Many coastal and oceanic shipping lines use the city's docks. The San Francisco-Oakland Bay Bridge, an 8¼-mile engineering marvel, connects Oakland with San Francisco across the bay. A tunnel through the Oakland hills speeds motor traffic.

Oakland is the heart of a large metropolitan area that includes the East Bay cities of Alameda, Albany, Berkeley, Emeryville, Hayward, Piedmont, and San Leandro. Many people who work in San Francisco live here because of good transportation to that city and because of Oakland's fine residential area. This bay section is a busy industrial district. Hundreds of factories produce many products. Among the most important manufactures are automobiles and equipment, food products, chemicals, and machinery.

Among the city's many scenic attractions are Lake Merritt, a mile-long tidal lake receiving salt water from San Francisco Bay; Skyline Drive, with its magnificent views; Lakeside, Peralta, and Sequoia parks; and the Heights, once the home of the poet Joaquin Miller. Mills College, one of the oldest women's colleges in the nation, is located here.

The site of Oakland was once Spanish crown land granted to Luís María Peralta. Oakland was incorporated in 1852 and named for the California live oaks, or *encinas*. It has a council-manager government. Population (1950 census), 384,575.

OATS. "A grain which in England is generally given to horses, but in Scotland supports the people." This is the definition of oats given in the dictionary written in the 18th century by Dr. Samuel Johnson. "True enough," was a Scotsman's ready reply to this gibe, "and where will you find such fine horses as in England, or such fine men as in Scotland?" Oats are indeed a most nutritious food for both men and animals. The grain is high in protein value and in vitamin B_1, and also has a sizable fat content.

The world's production of oats is about one third that of wheat or corn. The United States grows one to one and a half billion bushels a year, about one third of the reported total. Russia no longer publishes its figures, but in 1934–38 its crop exceeded that of the United States. Other leading producers are Canada, Britain, France, and Germany.

Oats are sown like wheat. The broadcasting method needs two to four bushels an acre; the drilling method requires less. An average yield per acre is 20 to 30 bushels. Oats will thrive on poorer soil and in colder climates than other grains. Hardy varieties are grown almost to the Arctic Circle. In Scotland, Alaska, and Russia oats are a staple food crop. Common northern oats will not grow well in warm regions such as Mediterranean countries. They grow red oats.

The wild oat is considered by some to be the ancestor of the common oat. The wild oat is distinguished by long reddish-brown hairs at the base of the glume or scale protecting the kernel, the long twisted and bent "awns," or spikes, at the tip of the grain. The kernels of the wild oat are closely covered and widely separated. The cultivated variety originated apparently in Europe and probably was not known to the ancient Egyptians, Hebrews, Greeks, and Romans.

Oats are raised chiefly as food for farm animals. At one time they were grown mainly to feed horses. But since tractors have largely replaced farm horses, the bulk of the oat crop is fed to cattle and poultry. Oats are also raised for man's use. They are processed into flakes (rolled oats) or pellets for breakfast food, or milled into flour. Oats are grown to some extent for hay, silage, and pasturage. In the southern part of the United States they are used as a cover crop to prevent soil erosion. Furfural, an important by-product, is made from oat hulls. This solvent has many industrial uses.

In the United States both summer and winter oats are raised commercially. Winter oats, sown in the fall, are grown in the southern states. There are many varieties of oats. They differ principally in the form, color, or thickness of the grain, in the length of the straw, and in the time needed for ripening. Oats are relatively free from insect pests or plant diseases except the rusts and smuts. The losses from smut can be prevented almost wholly by treating the seed. Plant breeders have developed varieties which are highly resistant to or immune from rust or smut, besides producing early. Because of the shortness of the straw, these varieties are not easily lodged—that is, beaten down from the proper vertical position.

THE "OATMEAL" PLANT



The Clinton variety of oats is resistant to disease and has a very stiff straw. It is a highly productive plant. Pictured at the bottom left are the husks; at the right the seeds are shown with the husks removed.

The oat is a cereal grass of the genus *Avena*. Wheat, rye, and barley are members of one subdivision of the grass family which bear their seeds in spikes. Oats, however, like rice and sorghum, bear their seeds in a branching head known as a panicle. There are two main classes of common oats—the spreading oats with a panicle branching in all directions, and the side, horse-mane, or banner oats, with the kernels hanging on branches extending from only one side of the stem.

Every state in the United States grows oats, but the great oat-growing region lies in the north-central plains. Iowa, Minnesota, Illinois, and Wisconsin are the largest producers. These four states together generally raise more than 600,000,000 bushels a year—about one-half of the United States total.

Scientific name of common oat, *Avena sativa;* red oat, *Avena byzantina;* side oat, *Avena sativa orientalis*. The common wild oat is *Avena fatua;* bristle-pointed wild oat, *Avena strigosa*. The short oat, *Avena brevis*, is grown in the mountainous localities of Europe.

OBERAMMERGAU, BAVARIA. The fame of its Passion Play makes the little German village of Oberammergau known throughout the world. It lies in the valley of the Ammer River, at the foot of the Bavarian Alps, 43 miles southwest of Munich.

In 1633 the black plague reached Oberammergau. The villagers vowed that if their community were spared they would present a Passion Play every ten years. No more deaths occurred, and the pledge has been kept almost unbroken for more than 300 years.

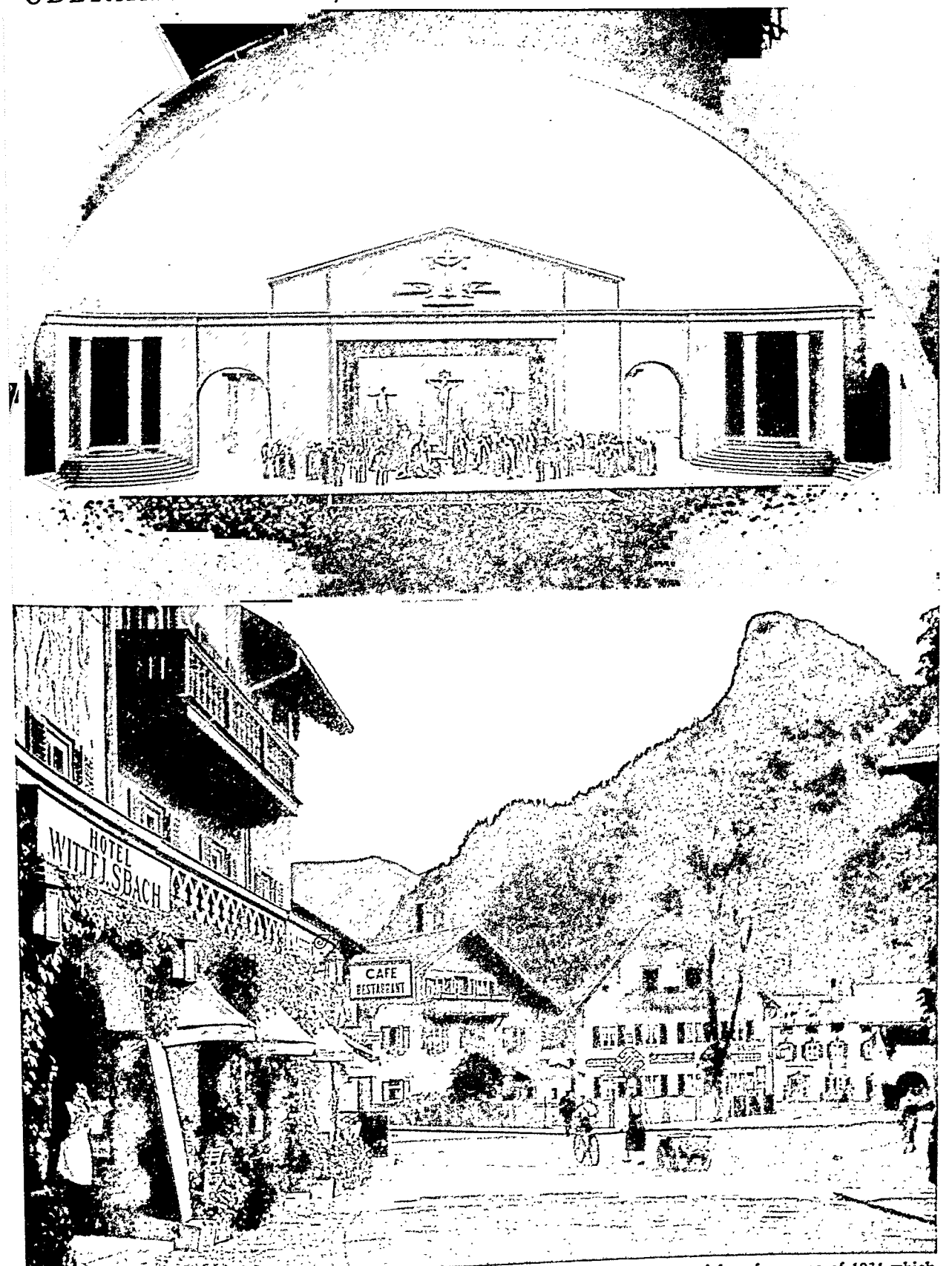
The first play was given in 1634. Beginning in 1680 the date was changed to the decimal years. Because of the Franco-Prussian War, the 1870 presentation was postponed until 1871. Disturbed conditions in Germany following the first World War delayed the 1920 production until 1922. An extra performance in 1934 celebrated the play's 300th anniversary. The play was omitted in 1940 because of the second World War, but was resumed in 1950.

The Passion Play depicts Christ's last days on earth, including the Crucifixion. Between the 17 acts are tableaux taken from the Old Testament, and orchestral and choral prologues. It is performed several times weekly from May to September, and lasts eight hours with an intermission at noon. Costumes of the period are worn, but no wigs or makeup are permitted. Men and boys of the village let their hair and beards grow for a year in advance.

The performers number about 700, chosen by an elected committee. They must be natives of the village and must lead exemplary lives. The women must be unmarried. The coveted role of the Christus was played in 1900, 1910, and 1922 by Anton Lang. His cousin, Alois Lang, was the Christus of 1930 and 1934. In 1923 Anton Lang came to America with a group of his associates and exhibited the handicrafts of the village. Offers to bring the play to America, or make a motion picture of it, have been refused. More than 400,000 visitors saw the 1934 performances.

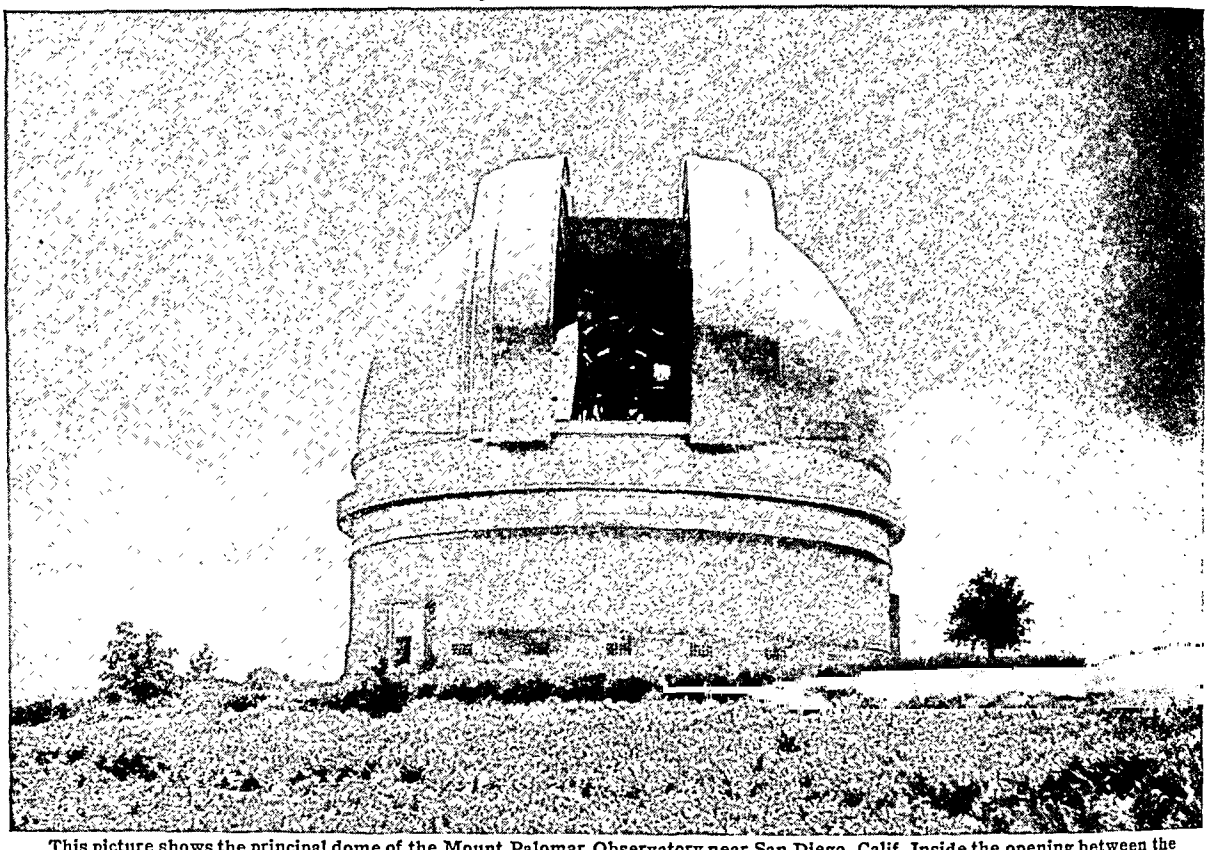
The people of Oberammergau are skilled artisans—woodcarvers, makers of toys, pottery, and jewelry. The woodcarving school is one of the finest in the world. The village itself is a beautiful relic of the Middle Ages. It looks like an illustration from a Grimm fairy tale. Population of Oberammergau (1946 census), 5,101.

OBERAMMERGAU, SCENE OF THE PASSION PLAY



The Oberammergau Theater (top) seats about 6,000 spectators. This is a scene from the special performance of 1934 which celebrated the 300th anniversary of the Passion Play. The village (bottom) lies in the shadow of the Bavarian Alps. Its citizens are skilled craftsmen and their homes are the delight of artists and tourists. Many are decorated with fresco paintings of Biblical scenes. One painting may be glimpsed above the Hotel Wittelsbach sign at the extreme upper left.

LOOKOUT POSTS *for* WATCHING *the* HEAVENS



This picture shows the principal dome of the Mount Palomar Observatory near San Diego, Calif. Inside the opening between the huge shutters is the upper end of the largest telescope in the world. The dome is 138 feet in diameter and weighs 2 million pounds. Yet it rolls so smoothly on circular, polished steel rails that anyone riding it could not feel the motion.

OBSERVATORY. High on the flat top of Mount Palomar in southern California stands a huge white and silver dome. Beneath the dome is the most precious scientific instrument in the world, the 200-inch reflecting telescope of the California Institute of Technology. Near by, two smaller domed buildings cover lesser telescopes. A shutter on each dome can be thrown back, and the dome and telescope beneath can be turned toward any point in the sky. In addition to these buildings are several dwelling houses for the staff, a power house, an office and storage building, and a museum.

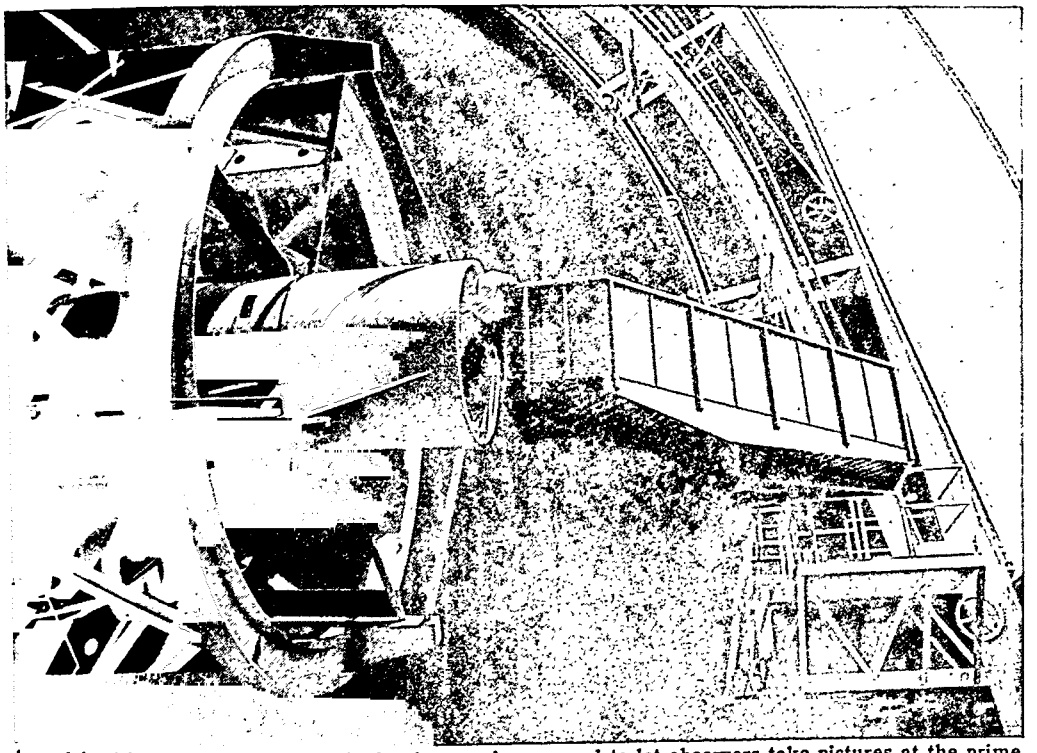
This great observatory stands in a lonely mountain region 50 miles from the nearest city, San Diego, and at an elevation of 6,000 feet. This high, isolated location was chosen for good reasons. Near cities the air may be fouled with smoke and the night sky is aglare with reflection from city lights. Its altitude places the observatory above most fogs and much dust; the air at high altitudes is also slightly thinner and more transparent. At low altitudes "boiling" (turbulence) in the air often makes stars shimmer so that they cannot be photographed well. But at higher altitudes this trouble is minimized or avoided.

The Main Telescope of an Observatory

The most important part of any observatory is its biggest telescope. This is either a *refractor* or a *reflector*. A refracting telescope uses a lens to gather and focus light. A reflecting telescope uses a curved mirror (*see* Telescope). A few observatories have big refractors as their main telescopes. The Yerkes Observatory of the University of Chicago at Williams Bay, Wis., is one. The big Yerkes telescope with its 40-inch lens and 62-foot tube is the largest of its kind in the world. In most observatories, however, the biggest telescope is a reflector. Next to the 200-inch telescope, the biggest reflector is the 100-inch instrument at Mount Wilson Observatory. Next largest is McDonald Observatory's 82-inch instrument. It is owned by the University of Texas and operated by the University of Chicago. A 120-inch reflector is being built for the Lick Observatory at Mount Hamilton, Calif.

All great telescopes are constructed and used for special purposes. The Palomar giant, for instance, is mainly used for photographing galaxies 500 million to one billion light years away. No other telescope can penetrate this region. The Mount Wilson 100-inch instrument is used principally for investigating galaxies within its extreme range of 500 million light years. The Yerkes 40-inch refractor is used mostly for measuring the *parallaxes* and *proper motions* of stars (*see* Star). It is also used to photograph and measure objects within the solar system. Unlike

TAKING A RIDE ON A TELESCOPE



As explained in the article, the 200-inch telescope is arranged to let observers take pictures at the prime focus near the front of the instrument. The picture above shows how an observer gets to this point. A platform elevator runs up the ribbing of the dome just inside the shutter and takes the astronomer to the front of the telescope. There he can step into the observer's house in the center of a tube.

most big telescopes, it is often used by observers to look directly at heavenly objects.

In all telescopes used for photography, pictures are taken in much the same way. The astronomer first trains the telescope on the proper section of the sky. A small telescope called a *finder*, attached to the main telescope, helps him sight on the right stars. He starts the motor which turns the telescope and keeps it following the objects to be photographed. Then he puts a glass photographic plate or film in the plate holder at the focus point. In most big telescopes, the plate is always exposed at the lower end of the tube. But in the 200-inch reflector, a plate may be exposed at the prime focus near the upper end. Either way, an astronomer "rides" on the great telescope as it swings across the sky.

To photograph faint objects, plates may be exposed all night. During the whole exposure, an astronomer must *guide* the telescope. To do this he follows a particular star in a guiding eyepiece, keeping it always on a cross-hair sight. (*See also* the description of observatory work in the article Astronomy.)

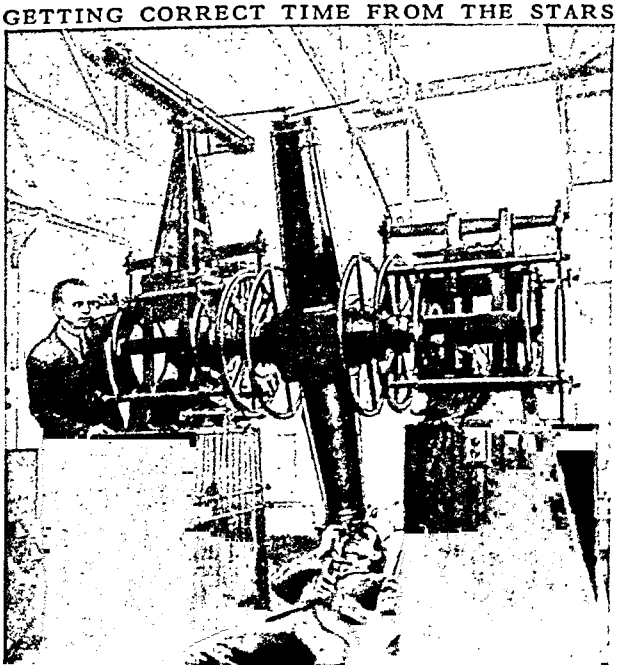
Smaller Telescopes

Almost all observatories use smaller telescopes in addition to their big instruments. Smaller refractors are often used for star-mapping projects. Most star catalogs have been made with moderate-sized refracting telescopes. This is true of the great Astrographic Catalog, the Franklin-Adams Star Charts, and the older *Bonn Durchmusterung*. Many of these smaller telescopes today are of the Schmidt type. This is neither a refractor nor reflector but a combination of both. It is often called the Schmidt camera.

All national observatories and some others mount *meridian telescopes*. Such an instrument can swing only between north and south. It is used to time the passage (*transit*) of stars across the meridian of the observatory. In this way astronomers establish precise time and also determine the exact positions of stars. The *zenith telescope*, which is fixed on the point overhead, is used for the same purposes.

In addition to determining correct time, national observatories must prepare *almanacs*. These give the exact positions of the sun, moon, stars, and planets for the coming year. Other tables show the times of sunrise and sunset, moonrise and

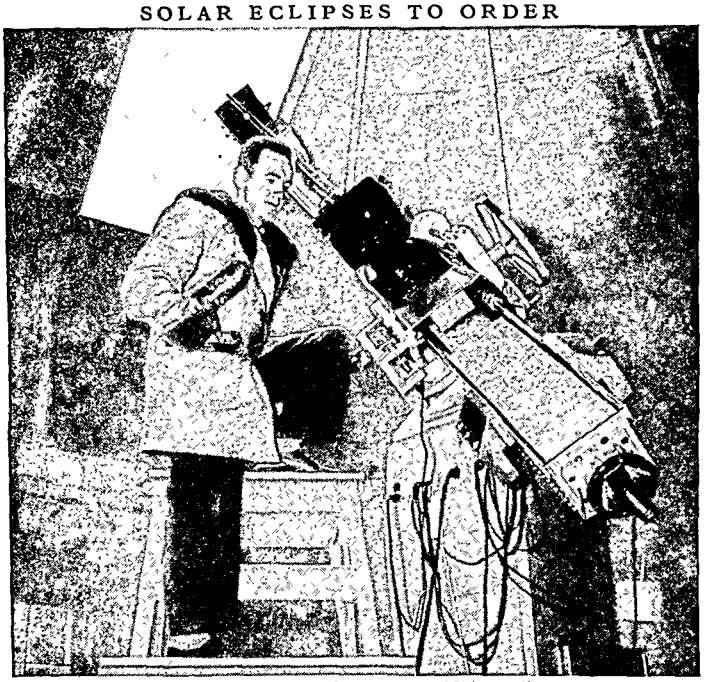
GETTING CORRECT TIME FROM THE STARS



The United States Naval Observatory establishes correct time for the whole country. Using a meridian telescope, astronomers check the time certain "clock stars" cross the meridian. This instrument swings only in the plane of the meridian. The astronomer lying under the telescope is making the observation while the other reads an altitude scale through a microscope.

moonset, and the length of twilight. An almanac also gives the time and place of predicted eclipses. Almanacs are used mainly by navigators and astronomers. The most widely used are the Nautical Almanac, prepared by the Royal Observatory in Sussex, England, and the American Nautical Almanac, prepared by the United States Naval Observatory in Washington, D.C.

SOLAR ECLIPSES TO ORDER



The coronagraph, shown here, produces an artificial eclipse of the sun. It blanks out the bright disk of the sun and allows the corona to be studied. America's only coronagraph station is operated by the Harvard Observatory. It is located near Climax, Colo., at an altitude of 11,500 feet.

Spectrographic Work

Many observatories use *spectroscopes* and *spectrographs* in connection with their telescopes. These instruments break up the light from a star into a spectrum which can be studied (*see* Spectrum and Spectroscope). With their aid astronomers are able to learn a great deal about the temperature, composition, and motion of stars. The *spectroheliograph* is a somewhat similar instrument used for studying the sun.

Very little of an astronomer's work is actually done at the telescope. Much of it is done in offices. Here astronomers and their assistants measure, analyze, and compare photographs and spectrograms of the heavenly bodies. In a big observatory dozens of calculating machine operators assist them. Such work is tedious but valuable. Most additions to men's knowledge about the stars come from such drudgery.

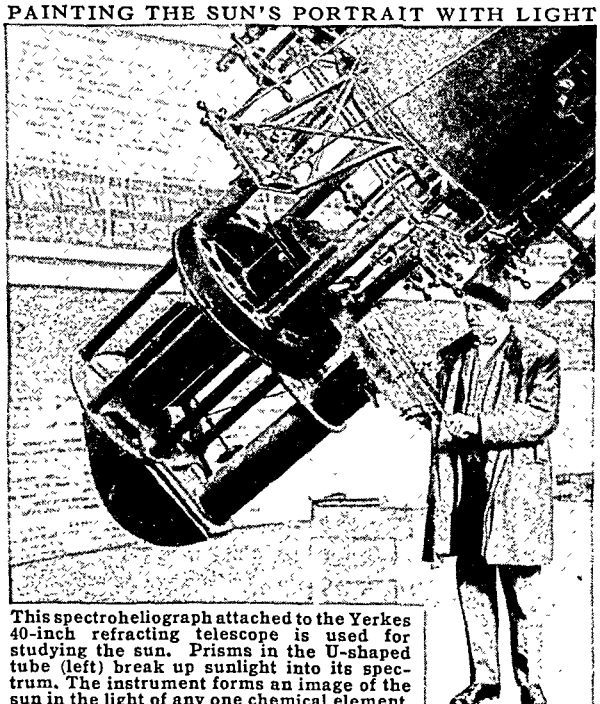
Observatories that do spectrographic work also have an astrophysical laboratory. Here astronomers try to duplicate the conditions of great heat and pressure that exist on the stars. In this way and by many other means, they are able to learn much about the composition of the stars themselves.

Not all of an observatory's work is done at the main station. At the time of a total eclipse of the sun, many observatories send expeditions to places where it is visible (*see* Eclipse). They take along portable telescopes and special equipment which they set up in the field. (For picture, *see* Astronomy.)

Some observatories maintain permanent stations in the Southern Hemisphere. At these stations, stars invisible in the Northern Hemisphere may be studied. The Southern Station of the Harvard Observatory at Bloemfontein, South Africa, is an example.

A few observatories also maintain special stations for study of the sun's corona (*see* Sun). Formerly the corona could be seen only during the few minutes of a total eclipse. But since about 1930 astronomers have had the *coronagraph*, an instrument that makes an artificial eclipse for them. The coronagraph requires extremely clear atmosphere. So these instruments are mounted only in special mountain-top stations.

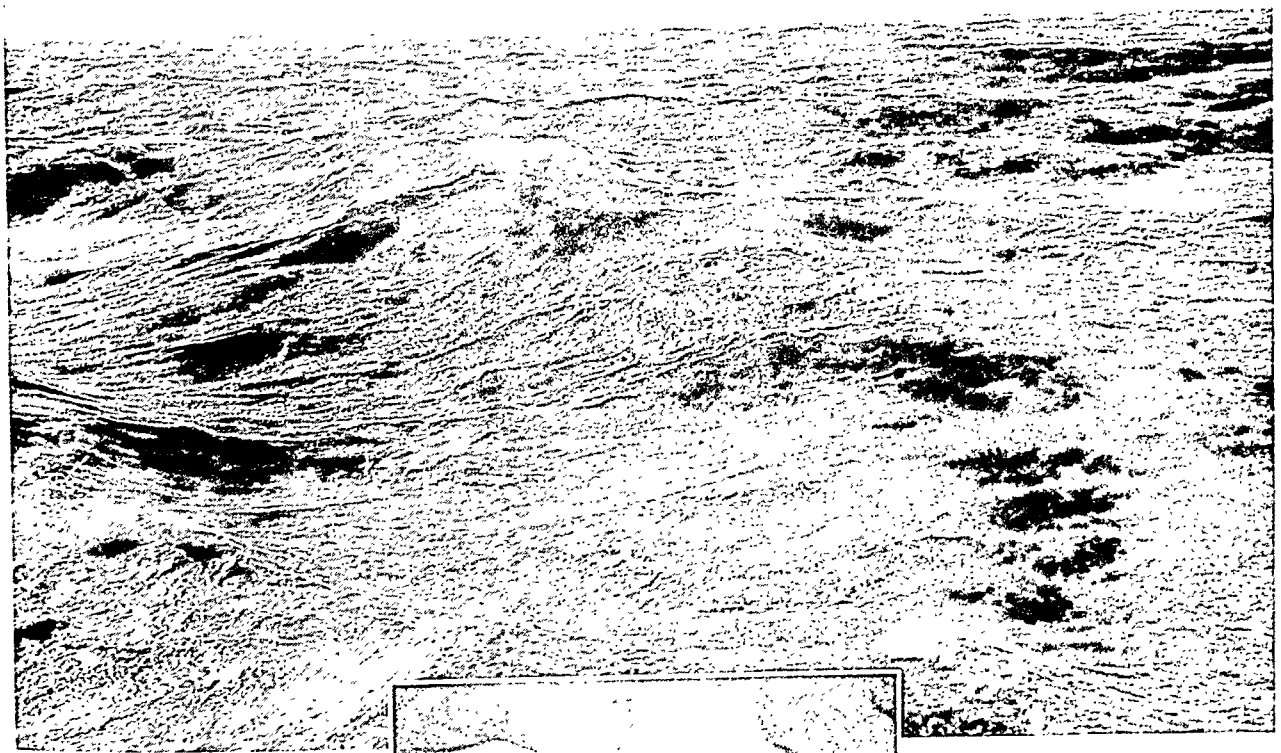
PAINTING THE SUN'S PORTRAIT WITH LIGHT

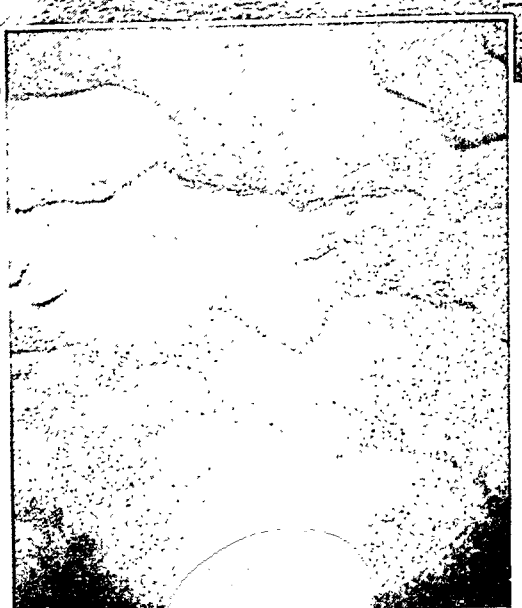


This spectroheliograph attached to the Yerkes 40-inch refracting telescope is used for studying the sun. Prisms in the U-shaped tube (left) break up sunlight into its spectrum. The instrument forms an image of the sun in the light of any one chemical element, thus showing the distribution of that element.

The most important national observatories, besides those of England and the United States, are those of France (Paris), Russia (Pulkova), Germany (Potsdam), and Argentina (Córdoba). Noted American observatories include those mentioned previously as well as Harvard Observatory (Cambridge, Mass.), Lowell Observatory (Flagstaff, Ariz.), Perkins Observatory (Delaware, Ohio), and the Astrophysical Observatory of the Smithsonian Institution (Washington, D.C.). The Dunlap Observatory (Richmond Hill, Ont.) and Dominion Astrophysical Observatory (Victoria, B.C.) are noted Canadian observatories.

The OCEAN—*Guardian of Many* MYSTERIES





The vast stretches of the ocean and its eternally restless waves conceal a world that challenges explorers. The underwater camera can photograph only small patches of the ocean floor, such as the one shown here.

OCEAN. Four vast basins in the earth's surface hold the oceans. They are the Pacific, Atlantic, Indian, and Arctic oceans. With their adjacent seas, they cover 71 per cent of the earth's surface. They hold so much water that if the earth were smoothed into a ball with mountains leveled and ocean deeps filled, the oceans and their seas would cover it about a mile in depth.

It is quite certain that most lands have been covered by the sea in past times, and some large areas have been submerged repeatedly. On the other hand we have no knowledge that any part of the deep ocean ever was land or that any existing land ever was beneath the deep ocean. Most of the limestone, sandstone, and shales on land were deposited as sediment on the bottom of shallow seas. Chalk, such as that found in England, Texas, and Kansas, was deposited on the bed of a sea and is made up of the shells of tiny creatures of the sea. During several periods of the earth's history large parts of North America were covered by the ocean. The fabled island or continent of Atlantis is said to have once been in the Atlantic.

Size of the Oceans

Oceanographers use several methods for fixing boundaries of the oceans. Most commonly, arbitrary lines are drawn where no land features mark natural boundaries. Sometimes depths of 4,000 meters or distribution of living organisms, climate, currents, and properties such as salinity, are used to bound the oceans.

Of the four great oceans, the Pacific Ocean is the largest and deepest. Its area (63,801,600 square miles) covers more of the globe than do all the continents. It is 9,400 nautical miles in width between Panama and the Philippines. In some parts it is over 35,000 feet deep. The Atlantic Ocean (31,830,700 square miles) is about half as large as the Pacific. Between Africa and the La Plata River in

South America it is 3,700 nautical miles in width. The Indian Ocean is nearly nine tenths as large as the Atlantic (28,356,200 square miles). The Arctic Ocean is much smaller (5,440,200 square miles). Sometimes the southern waters of the Pacific, Atlantic, and Indian oceans surrounding Antarctica are called a fifth ocean, the Antarctic Ocean or Great Southern Ocean. (*See also* articles on each ocean and **Ocean** table in FACT-INDEX.)

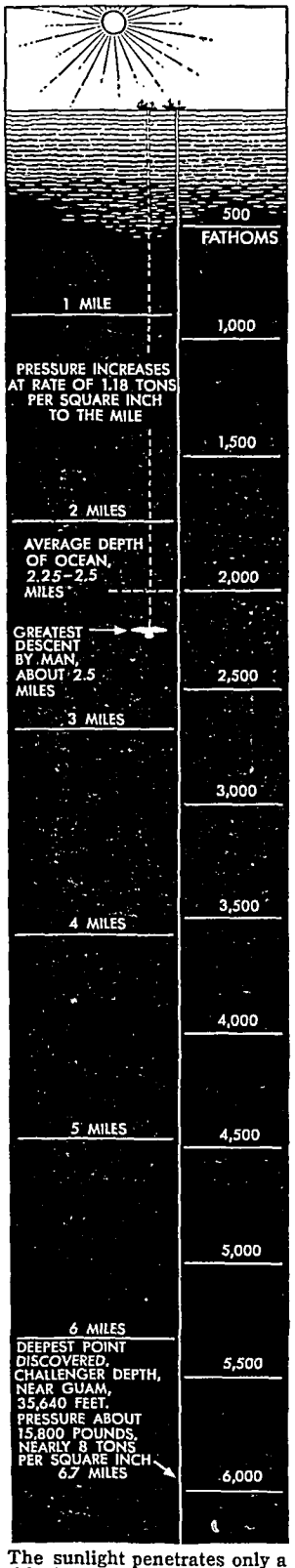
The oceans and their adjacent seas cover nearly three fourths of the earth's surface, or about 140,500,000 square miles. The volume of the oceans and adjoining waters is 14 times that of all land above sea level. This volume of water, frozen into a ball, would form a globe 850 miles in diameter. The average depth of the oceans is between $2\frac{1}{4}$ and $2\frac{1}{2}$ miles. Modern echo-sounding methods, such as sonar, have indicated that the ocean beds are as varied as the surfaces of the continents, with mountain ranges, plateaus, canyons, valleys, hills, isolated mountains, and lowland plains (for picture, *see* Cables).

The Saltiness of the Oceans

The sea contains all the minerals that have washed off the face of the earth since the beginning of time. There are 35 parts of salts in every 1,000 parts of sea water. These salts contain many minerals besides the sodium chloride which we use in our food. Some of these salts are extracted commercially, notably magnesium and bromine. Much of the magnesium used in airplane manufacturing, for example, comes from the sea. Other minerals are present but in such great dilution that it is not yet commercially practicable to obtain them for man's use. Since we are using the resources of the land at an alarming rate, however, we shall probably have to turn to the sea in the not too distant future.

The chemicals most important to life in the ocean are phosphates and nitrates. They are used for growth by the myriads of microscopic floating plants that form the basic source of life in the sea. In some areas, in the spring, the plants may use up all the phosphate present at the surface and then die. However, autumn storms, ocean currents, and the general circulation of the sea accumulate more phosphate for a new growth of plants in the autumn. The plants are eaten or die in the winter and in the spring a new growth occurs. The sea thus plows and fertilizes itself and can never wear out as badly used farmland often does. (*See also* subhead "Diatoms and Pastures of the Sea" later in this article.)

BLACK OCEAN DEPTHS



The sunlight penetrates only a thin layer of the ocean's surface. At a depth of about 600 feet there is insufficient light for plant growth in clear ocean water.

Other important chemicals present are hoarded by plant and animal life. This is the basis for the extraction of iodine from seaweeds and vitamins from fish livers, to take but two examples.

Gold too is present in huge quantities. It is in such great dilution, however, that extraction costs are prohibitive.

Exploring the Depths of the Sea

Now that man has conquered Everest, the highest mountain on earth, the oceans will probably be the last great exploration frontier until the advent of space travel. The most modern diving equipment has descended about $2\frac{1}{2}$ miles into black depths whose lowest known point is almost seven miles below the surface. (For pictures, *see* Earth; Atmosphere.)

An ordinary collapsible diving suit makes possible a descent of about 400 feet. Submarines have gone deeper than 600 feet, although the United States Navy's official figure for operational dives is 250 feet. The potential of the atomic submarine has not been disclosed (*see* Diving; Submarine).

Greater Depths Made Accessible

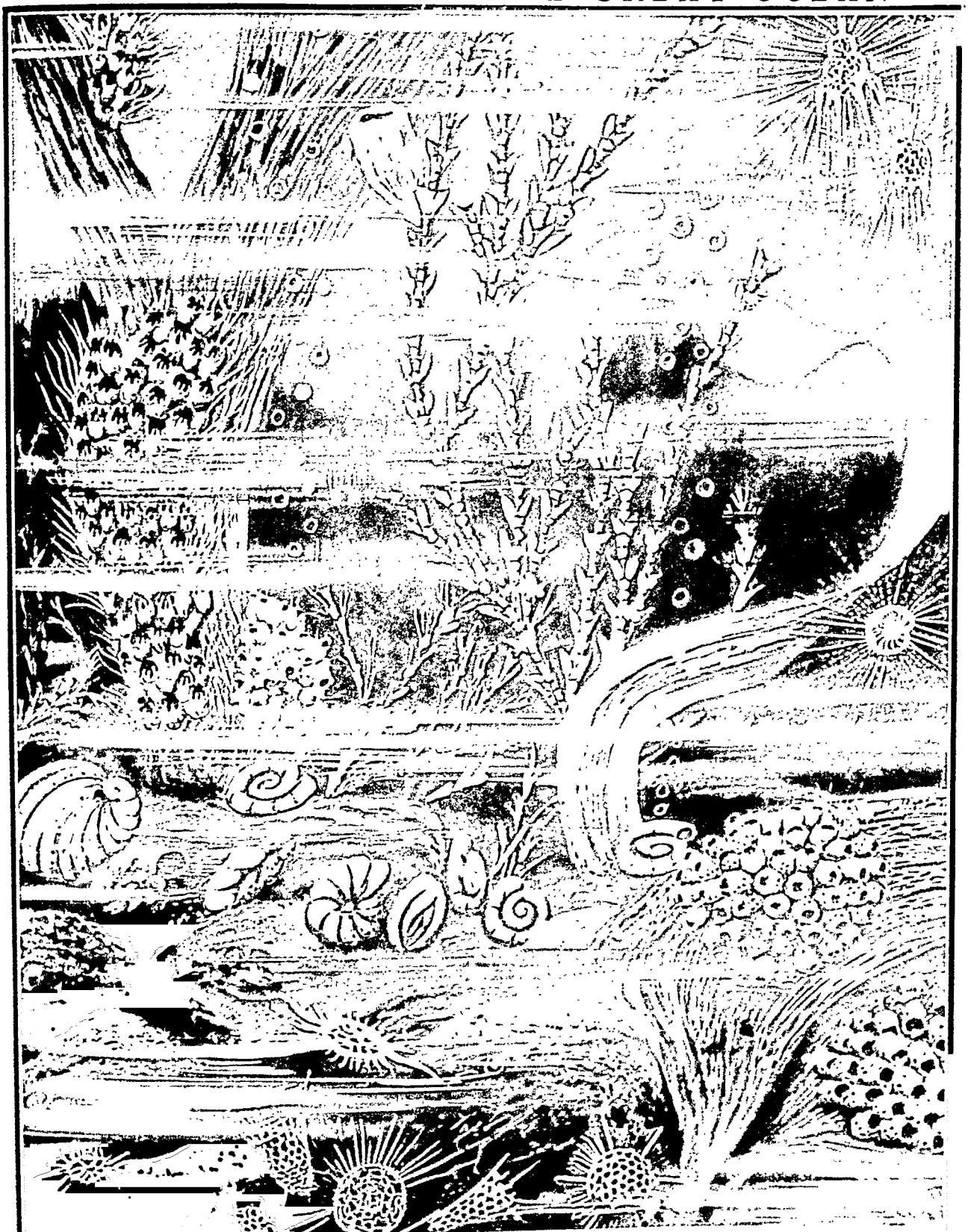
William Beebe and Otis Barton made a record dive of 3,028 feet off Bermuda in 1934. They used a 2-ton hollow steel ball called a bathysphere (*see* Beebe).

Barton made a new record off the California coast in 1949. He descended to 4,500 feet in a device called a bathoscope. This $3\frac{1}{2}$-ton steel sphere was $57\frac{1}{2}$ inches in diameter. One of its windows was designed to take motion pictures. Oxygen was supplied from tubes (for picture, *see* Exploration).

In 1953, Auguste and Jacques Piccard descended over 10,300 feet into the Tyrrhenian Sea. They used a bathyscaphe, which consisted of a diving compartment suspended beneath a 60-foot submarine-shaped hull of thin steel filled with gasoline to give buoyancy. To descend the bathyscaphe releases gasoline; to rise it drops iron ballast.

Man's greatest descent into the sea was made by two French naval officers in 1954. Using a bathyscaphe, they dived over 13,200 feet (about $2\frac{1}{2}$ miles) off Dakar, French West Africa.

TINY MARVELS OF THE GREAT OCEAN



This looks like a photograph of strange monsters. Actually, it shows what the microscope revealed in a rocky pool, in a spot only as large as the small square at the left. Most of these creatures are so small that the naked eye could not perceive them, but a powerful microscope reveals them in all their fascination. With the aid of modern instruments we are gradually learning more and more about all the strange forms of animal and plant life in the seas, and to read the story of evolution—a story which began ages ago in ocean waters. It is from primitive creatures such as these that scientists are slowly putting together the story of how higher forms came into existence, for many of them are the present-day descendants, practically unaltered in forms and habits, of the first forms in which organized animal and plant life appeared on our planet. Truly, the ocean is a fascinating book of life, when even a drop holds such wonders as these.

What man could not visit in person could, however, be reached and explored with instruments.

Some Early Discoveries

One of the first ocean explorers filled a glass tube with air, sealed it, wrapped it in thick flannel, and put it in a copper tube, making tiny holes at the top and bottom of the outer tube so that water might enter. Then he sent the tube, filled with air, down 12,000 feet. When he drew it up the thick copper tube was pressed flat, and the glass was reduced to a mass of powder.

From their earlier experiences, men for a long time believed that no life could exist down in the ocean depths. No sunlight ever reaches more than a few hundred feet below the surface, and where there was no light, it was argued, there could be no plant life. Where there was no plant life there could be no animal life, and so the great ocean floor, it was reasoned, must be a desolate region of emptiness and death. But then a strange thing happened. A telegraph cable in the Mediterranean broke at a depth of more than 7,000 feet, and when the broken ends were raised it was found that the cable was overgrown with an astonishing variety of living creatures. It was certain that they had been alive in the dark and icy cold of the sea bottom, with tons of water bearing upon them.

Investigating the Greater Depths

Now that men have found new ways of collecting information and material from the ocean chasms, an extraordinary story has unfolded. They send down various sounding and dredging devices. They let down nets and iron hooks; instruments for measuring the temperature of the water; and bottles which open when they touch the bottom, fill with water there, and then close so that water at higher levels cannot enter. They make great nets which touch the bottom of the sea and close up tightly as soon as they are raised above the floor. In them are brought up from the bottom countless creatures from a realm unseen by man. Some are still alive; others have been killed by the extreme change of pressure. But, dead or alive, they provide rich clues for scientific study and speculation.

And what men find is that in this kingdom of the deep sea—a kingdom of darkness and almost freezing cold—is a great variety of life. The floor of the sea, it may be said, is like a living garden planted by Nature herself. Blind crablike forms crawl in and out of the strange undergrowth, but other creatures there are that not only have eyes, but shine with a soft dull light. There are, indeed, myriads of tiny living lamps that swim about illuminating the ocean-bed.

Explorers declare that on some parts of the floor of the sea there are millions of little creatures that shine like glow-lamps, and the discoveries that have been made in this direction are among the most interesting of all. When we make light by burning coal or gas or chemicals or by passing a current of electricity through the filaments of a lamp, we waste most of the energy in heat; only a little of it is transformed into light. But the phosphorescent light of deep-sea creatures—like the light of the firefly—is made without waste of heat. It is pure light, and a huge fortune awaits the man who can discover the way to make light in this way. Even some sharks are able to light up their paths through the deep sea with a white and heatless radiance. Certain glands in their skin give out a sticky substance, and it is this substance that makes them shapes of living light. It is doubtful, however, if the shark ever penetrates to the deep ocean beds, and it is the deep-sea animals which are most phosphorescent.

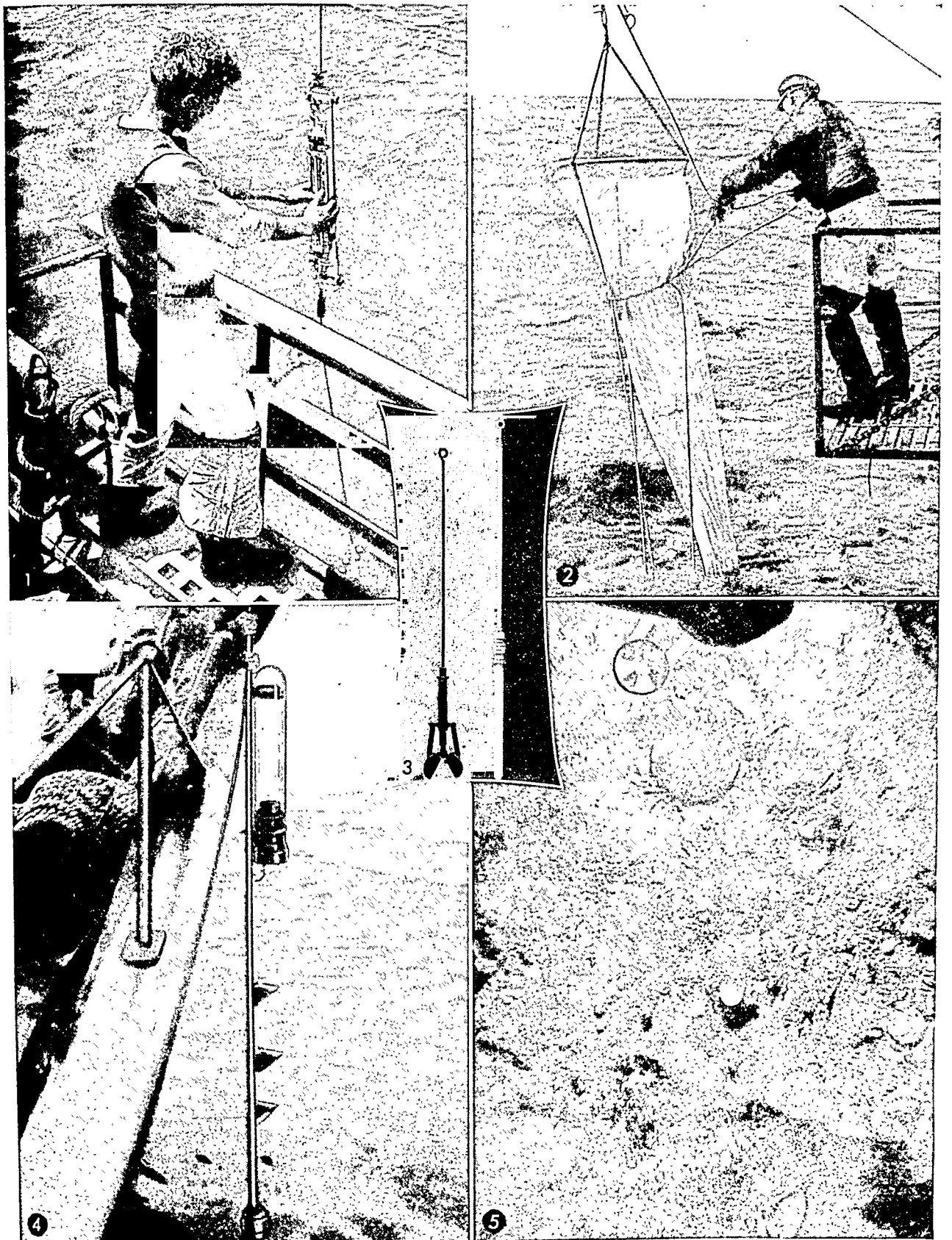
Animals can live under the great pressure of the deep sea because the pressure inside their bodies equals the pressure on the outside. A tin can could never be crushed by pressure from without if the pressure outward on the inside was equal to the pressure in from the outside.

The Curious Danger of Falling Up!

But though the inhabitants of the ocean abysses are able to live under an enormous load of water, they are liable to extraordinary accidents. If, in searching for food, they rise a considerable distance above the floor of the sea, the gases of their swimming bladders expand, and they become lighter. Up to a certain point the muscles of their bodies can resist this strange tendency to go floating upwards; and the deep-sea fish that has not completely lost control of itself can win its way back to its home in the dark cold heavy water. But if it travels too far towards the world of sunlight, its muscles are not strong enough to drive the body down. The fish continues to swell, and is gradually killed in its long and strange voyage to the surface of the sea. Thus the deep-sea fishes are exposed to a danger that comes to no other animal in the world—the danger of tumbling upwards! That such accidents do occasionally occur is shown by the fact that some unknown kinds of fish, now known to be deep-sea forms, were found floating dead on the level of the ocean long before men dreamed that life could exist at such depths. When brought up suddenly from great depths, animals sometimes explode because of the expansion of gases within the body when pressure from the outside is greatly reduced.

The great problem which has perplexed the explorers of the deep sea for many years is the question of how life is maintained so far below the waters. What do the creatures of the abyss feed upon? It is clear that they cannot keep up life merely by eating one another, for this would mean that the biggest would eventually swallow all the rest, and then die of starvation because there was nothing more to eat. All animal life must have plant life to feed on. This is as true of the wild strange animals of the deep as of the cattle of our pastures. But we have seen that no ordinary plants can grow in the sunless underworld of water. How, then, is animal life maintained there?

HOW THE DEEP WATER IS EXPLORED



Since men cannot descend to the lower depths of the ocean they send exploring instruments down instead. 1. To determine the temperature of various levels a deep-sea thermometer is lowered. 2. This net with its opening and closing device will gather samples of the life at any desired depth. 3. These instruments bring up samples that show the composition of the ocean bottom. 4. An underwater camera is lowered in a glass tube, and the lamps on the rod provide light for the picture. 5. An example of a photograph made with the underwater camera 400 feet down.

A few years ago no man was able to answer this question properly, and it was not until great progress had been made in the study of those microscopic forms of life that the secret of the ocean abyss was fully revealed.

We now know that in addition to the conspicuous inhabitants of the ocean which can be seen with the naked eye, the waters teem with vast swarms of microscopic life. According to their general habits, all marine organisms can be placed in three groups. The *benthos* are those plants and animals, which live on or are attached to the sea bottom. Such, for instance, are the rockweeds and corals, and many of the worms and mollusks. Organisms which live in the water itself, like the fishes, whales, and seals, and move about actively from place to place are the *nekton*. Still other forms—most of them of microscopic size—which float about passively, drifting here and there at the mercy of the tides and currents, are known as the *plankton*. This last group of plants and animals was practically unknown until the middle of the last century, but we now know that it is the primary and all-important group upon which all other ocean animal life depends.

The Diatoms and the Pastures of the Sea

A traveler over the sea may think he is sailing through an almost barren waste of waters because no life may be visible. But let him draw a fine net of silk through the water and examine the catch of "scum" under a powerful microscope and he will be astonished at the wealth of life which is revealed. He would see *diatoms*, which are single-celled algae encased in a glasslike box, so graceful and varied in shape and so delicately ornamented that no artistic jewelry of the finest manufacture could surpass them in beauty. He would see protozoa, too, with elegant shells of mineral material, strange larvae of all sorts, tiny crustacea, and many other forms of life which only an expert could recognize and name. Minute as are these organisms, many others even smaller he could not see because they escape through the meshes of even the finest net.

Now it is these diatoms and other green plants of the plankton which make the sea a pasture. They are to the fishes and other animals of the ocean what grass is to the cattle in the fields. They live in the surface waters, and especially in the shallow water zone where they can use the sunlight in building up their bodies. They are like little chemical factories, employing the heat and light of the sun in making food from the minerals dissolved in sea water. They multiply at an astonishingly rapid rate and form the basic food for all other ocean animal life. Even when they die their bodies fall into the depths of the ocean and provide food for the animals there.

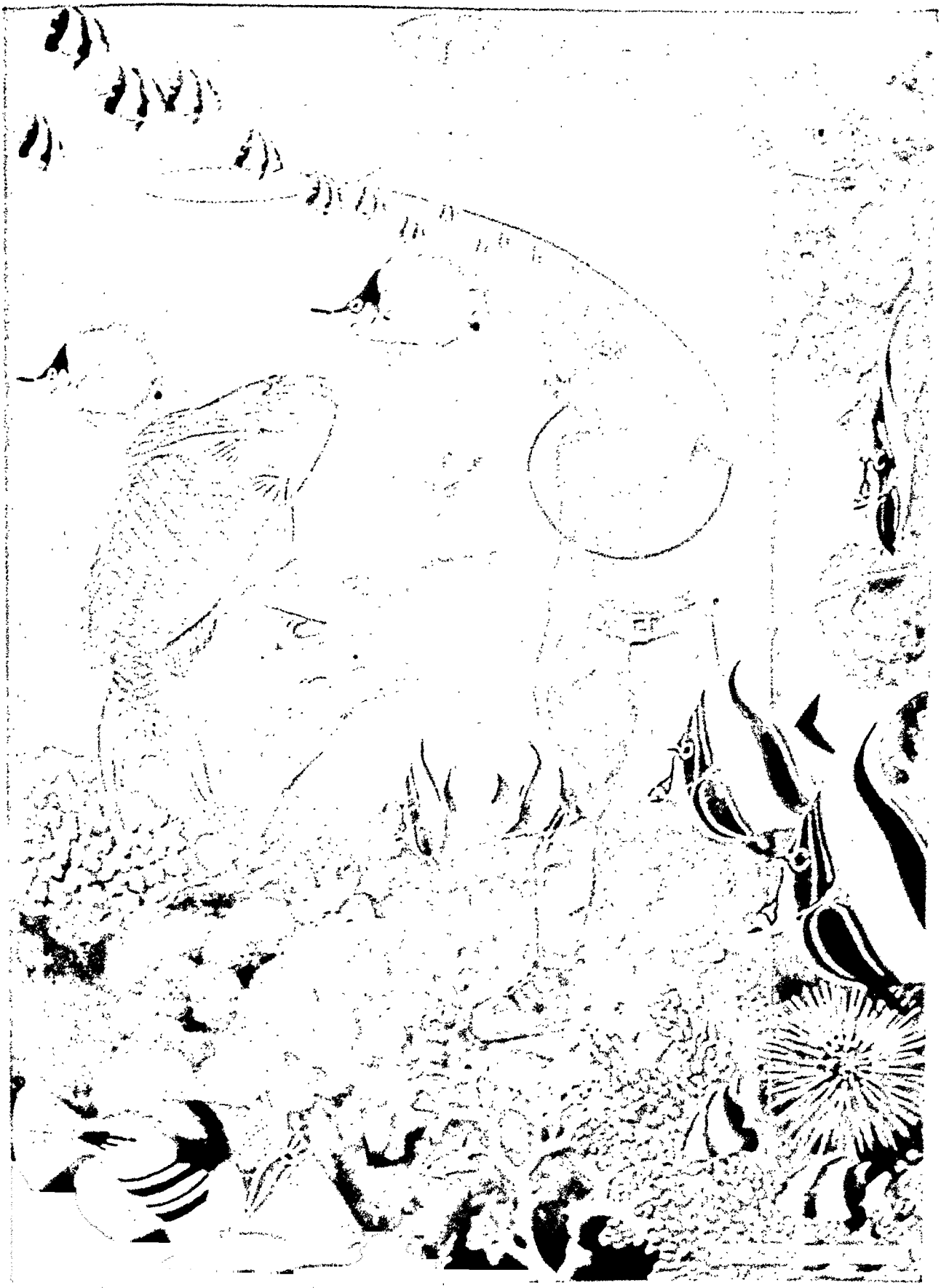
The value of the diatom does not end with death. Its crystalline case endures for millions of years. Through ages past, diatom shells have accumulated on the ocean floor in immense deposits. Great geological convulsions have frequently raised these ocean beds and they have become dry land. Thus, the diatomaceous earth, as it is now called, is made available for man's use. It furnishes insulating material against heat and sound, enters into the preparation of dynamite, becomes a filler in making rubber and cement, produces excellent filters, and because of its abrasive properties, it is extensively used in scouring powders and even tooth pastes!

The life of the oceans is most abundant in the surface waters down to about 600 feet, is less abundant in the intermediate depths, and becomes more plentiful at and near the bottom. A whitish or grayish ooze covers about a third of the ocean bottom, and there are vast areas of red clay formed by the decomposition of shells and by pumice and other volcanic materials, and of wind-blown dust. There are extensive "continental shelves," over which the water is shallow, covered with gravel, sand, and silt carried to the sea by the thousands of rivers which ceaselessly pour their floods into the oceans.

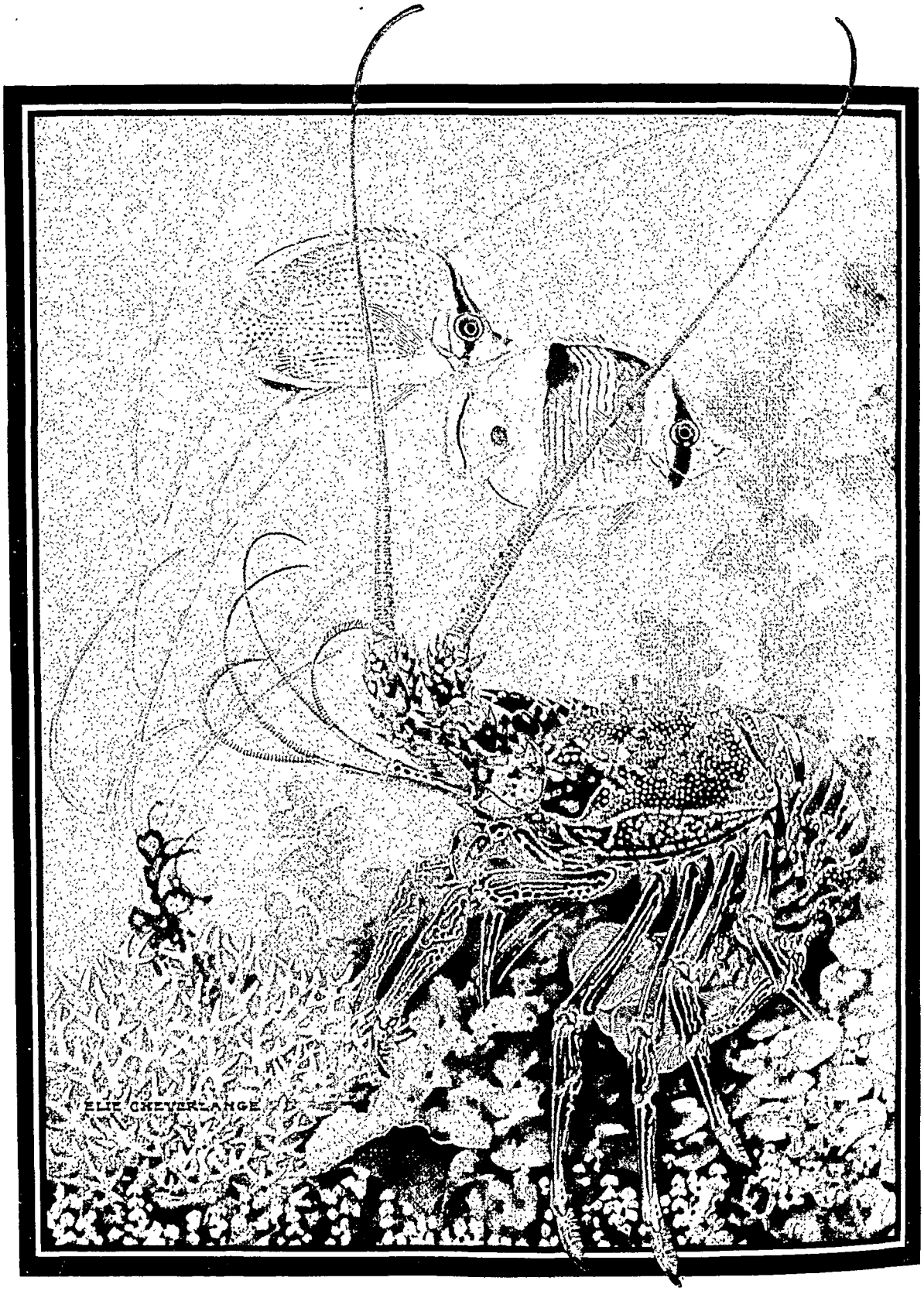
Enormous Fish Population of the Sea

If we consider merely the quantity of living matter in the oceans, the mind staggers before it, but a few figures help us to realize it. It was estimated a few years ago that in the small North Sea which sweeps the English coast there were then 10,000 million fishes, and there is a record of a fishing fleet that once ran into a school of mackerel 50 miles in circumference. What helps us most to form some notion of the number of fish in the sea, however, is the number of eggs that fishes lay. Even a sprat deposits about 5,000 eggs, and in the roe of a female cod are found some 8,000,000 eggs. A common herring lays about 25,000 eggs, and a big halibut 3,500,000, while the turbot is authoritatively calculated to lay no fewer than 14,000,000 eggs. Imagine the number of fishes laying eggs at this rate, and one might think that the products of the sea are inexhaustible. But even here, proper methods of conservation are needed.

The principal circulation of the ocean waters is maintained by three factors: (1) winds, (2) unequal temperatures, and (3) variable saltiness of the water. Of these three factors the winds are the most important, and are the chief cause of ocean currents. In equatorial regions the prevailing winds over the ocean are easterly winds, and the equatorial waters are drifted westward under their influence. As this moving surface water strikes the continents—as, for example, South America—it is divided, a part of it being turned northward and a part southward. That turned northward becomes the Gulf Stream of the North Atlantic. The corresponding current in the Pacific Ocean is the Japan Current. These warm currents of ocean water moving northward warm the air over them, and in middle latitudes this warmed air is carried over to the continents on the east sides of these oceans, because in these latitudes the prevailing winds blow from the west. This is one of the reasons why Scandinavia and Alaska are so much warmer than the same latitudes on the east sides of the continents.



THE "PAINTER OF FISHES" AT WORK



SOME UNDERWATER PORTRAITS

Here are some of the strange creatures that live beneath the Pacific, near the South Sea islands. The little fish at the top are members of the *Chaetodon* family, sometimes called "butterfly fish." The green speckled one is *Chaetodon citrinellus*, and the banded one is *Chaetodon falcula*. Below is a relative of the common lobster. Its scientific name is *Pallinurus penicillatus*. Along the bottom are white, lacelike stony coral, the orange spines of whip coral, and tiny sea plants called green calcareous algae.

From the large bodies of ice in the polar regions, large volumes of ice-cold water are poured into the oceans. These cold waters move southward along the east sides of continents, but presently sink beneath the surface. These great supplies of cold water from the polar ice keep the temperature of the ocean low. The mean temperature of the ocean is below 40° F., though the surface waters are much warmer.

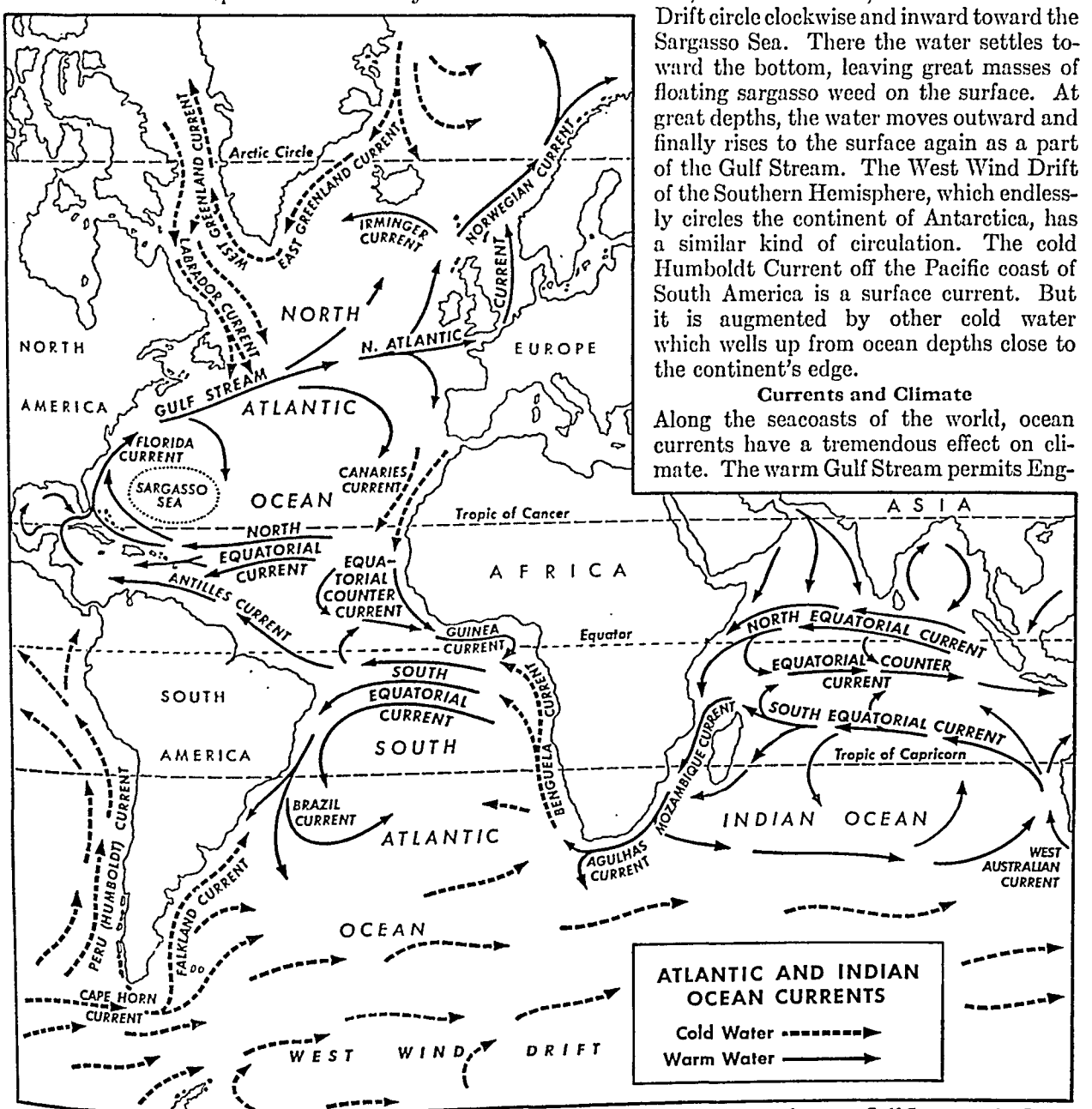
"Whirlpools" in the Ocean

Ocean currents are set in motion largely by steadily blowing winds. But the rotation of the earth has a great deal to do with the direction they take. The maps on this and the following page show that the main currents in the open sea are *rotating* currents. In the Northern Hemisphere they rotate in a clockwise direction; in the Southern Hemisphere they turn in the opposite (counterclockwise) direction. The rotation of the earth helps make moving water follow these circular paths in the same way that it causes the planetary winds. This is explained in the article on Winds.

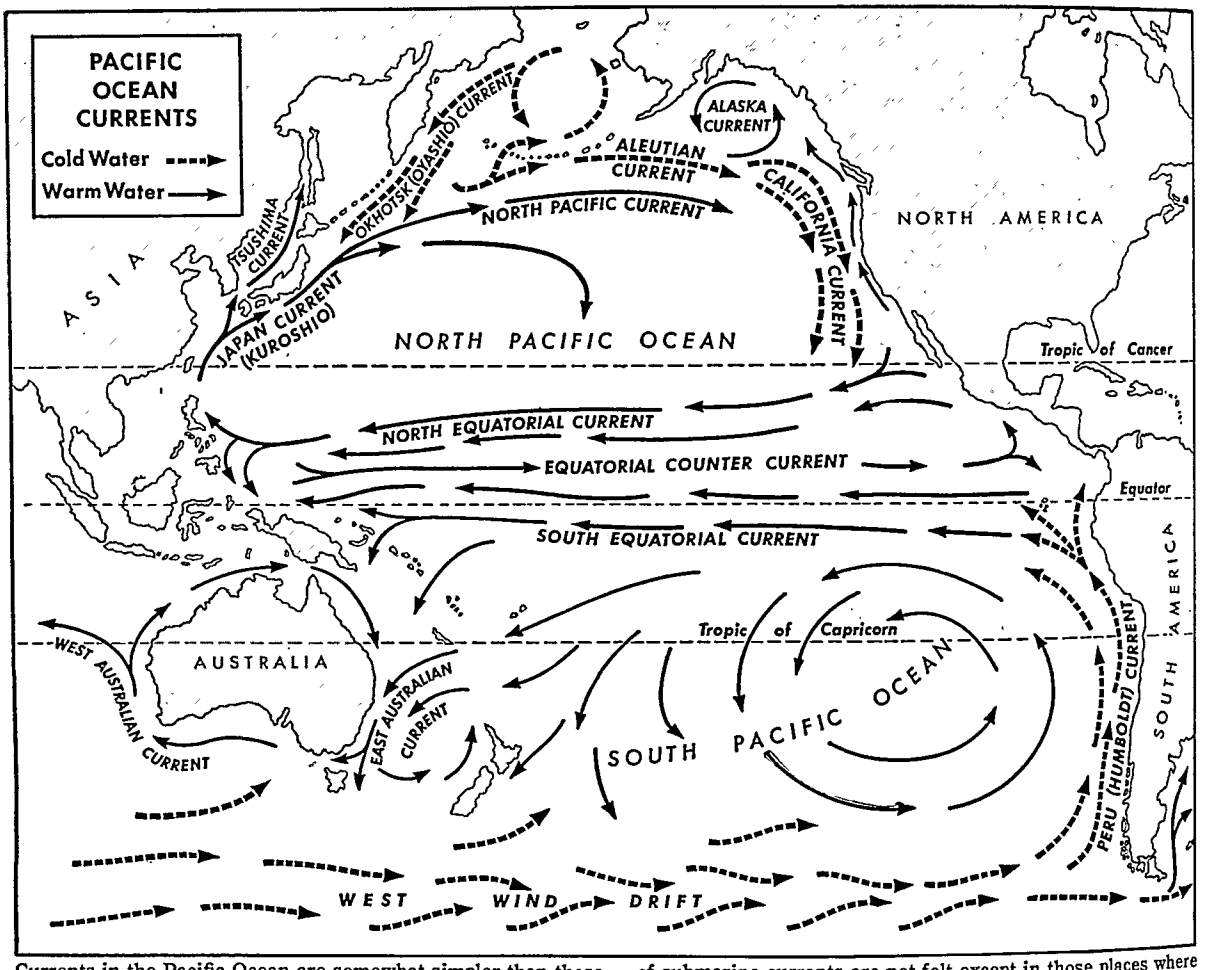
The surface currents that help or hinder ships as they cross the oceans are only a part of the whole system of ocean currents. Submarine currents circulate equally widely. Their motion is generally in an opposite direction. The great rotary current of the North Atlantic is a good example. The North Equatorial Current, the Gulf Stream, and the West Wind Drift circle clockwise and inward toward the Sargasso Sea. There the water settles toward the bottom, leaving great masses of floating sargasso weed on the surface. At great depths, the water moves outward and finally rises to the surface again as a part of the Gulf Stream. The West Wind Drift of the Southern Hemisphere, which endlessly circles the continent of Antarctica, has a similar kind of circulation. The cold Humboldt Current off the Pacific coast of South America is a surface current. But it is augmented by other cold water which wells up from ocean depths close to the continent's edge.

Currents and Climate

Along the seacoasts of the world, ocean currents have a tremendous effect on climate. The warm Gulf Stream permits Eng-



This map shows the principal surface currents of the Atlantic and Indian oceans. Notice how the Gulf Stream travels northward, warming the lands it passes, until it finally loses itself in the far reaches of the Arctic north of Europe. It can also be seen how the cold Labrador Stream meets the warm Gulf Stream at the Grand Banks of Newfoundland. Cold air over the one current condenses moisture from the warm air over the other and causes the dense fogs that constantly hang over the Grand Banks.



Currents in the Pacific Ocean are somewhat simpler than those of the Atlantic because there are no large land masses to obstruct them. Below the surface is another system of currents that move generally opposite to those at the surface. The effects of submarine currents are not felt except in those places where they well up and join the surface system. Along the equator currents vary a great deal from month to month. This map shows the main direction of movement through the year.

land to enjoy a mild and equable climate while Labrador, in the same latitude, suffers under a subarctic climate.

The warm currents in the oceans also give rise to fogs which are very troublesome to navigation. The warm air over the Gulf Stream, for example, is heavily charged with moisture. When it is carried by the winds beyond the Gulf Stream over colder waters, the moisture in the air condenses and forms fog.

The cold Humboldt Current partially accounts for Chile's predominantly desert climate. It cools the west winds passing over it and they drop much of their moisture. As they pass over the land, the winds are warmed. Then they not only fail to give up moisture; they suck up more from the earth. At intervals a warm ocean current from the north will briefly replace the Humboldt Current, with astounding consequences. The climate changes abruptly; violent thunderstorms occur, and torrential rains make the desert lands bloom.

Why the Ocean Is Salty

The water evaporated from the sea is borne to the land, and some of it is condensed and falls as rain or snow. More than 6,500 cubic miles of water falling on the land is yearly sent back to the sea by rivers, carrying with it salts and earthy matters. The saltiest waters are found where evaporation is the greatest. The Red Sea, for example, and the trade-wind regions of the ocean basins are saltier than adjacent areas. Because of the constant circulation in the ocean, oxygen and other gases of the air are carried down to the greatest depths; thus animals and plants may flourish there. For sounding the ocean's depths the sonic depth finder and (supersonic) fathometer are now used. They send a sound wave or supersonic wave down to the ocean bottom and note the time when the echo returns. The machine automatically translates this time interval into the measure of depth reached by the impulse.

Observations indicate that along the coasts of the United States the mean surface level of the Pacific Ocean is about two feet higher than that of the Atlantic. Furthermore, the levels of both oceans increase in height from south to north. Scientists show that the blue color of the sea is due only to reflection of the sky. Patches of other colors—green, brown, or red—in the open ocean are caused by microscopic organisms in the water.

OCEAN PERCH. Although it was practically unknown to the fish-eating public until about 1935, the ocean perch has become the leading food fish taken by Atlantic coast fishermen. Not until the filleting of the fish was attempted did a market develop. In 1933 only 264,000 pounds were caught. By 1951 the catch had increased to 260 million pounds.

The ocean perch is a vivid orange or red, with paler underparts and large black eyes. Fishermen call it *redfish*, and until recently its official name was *rosefish*. It is one of the few commercial fish that give birth to live young. The young are spawned from June to September. They grow slowly, about an inch a year, until their eleventh year when they mature. The average weight is three fourths of a pound.

Practically the entire catch is taken by otter trawls in depths of 50 to 125 fathoms (300 to 750 feet). Fishing is carried on throughout the year, but only during daylight hours, for the fish rise off the bottom and scatter at night. The United States catch is landed at Boston and Gloucester, Mass., and at Portland and Rockland, Me. The entire catch is filleted. Since the fillets represent less than one third the weight of the fish, there remains a large volume of waste material which is manufactured into meal and oil.

Ocean perch belong to the rockfish family *Scorpaenidae*. The scientific name is *Sebastes marinus*.

O'CONNELL, DANIEL (1775-1847). Throughout the 18th century Ireland suffered under the oppression of its English rulers. The Act of Union (1800) had joined Ireland to England and dissolved the Irish parliament. The Catholics were debarred from voting and holding public office. The best land was held by English absentee landlords and worked by Irish peasants who lived in great poverty (*see* Ireland).

Daniel O'Connell was a successful Irish Catholic lawyer who undertook to help his people. He set about uniting the Catholics on a political program which included the right to sit in the British Parliament. They had been excluded since the 17th century. He won the support of the priests and organized the peasants in 1823 in the Catholic Association.

Within a year the association became a powerful political force. The Duke of Wellington, who had consistently opposed the Irish claims, now agreed that it was better to give the Catholics virtually complete rights of voting and holding offices than to risk war. The Catholic Emancipation Act of 1829 was O'Connell's greatest achievement. But Catholic "emancipation" was 30 years too late. O'Connell spent the rest of his life in agitation for Home Rule. He also sought laws which would insure the rights of the tenants against their landlords and relieve the Catholic peasants of paying tithes to the English church. In this last he was successful (1838), but in little else. His great work was done in 1829. He had done much more than emancipate the Catholics. He had roused a discouraged people and thus prepared the way for later leaders.

OCTOBER. The name of this month is from the Latin *octo*, meaning "eight"; it was the eighth month of the year at Rome, but it became the tenth when the beginning of the year was changed from March 1 to January 1 (46 B.C.). At the same time it was increased from 30 to 31 days.

"Head-Footed" MONSTERS *That Fight with* SUCKERED TENTACLES

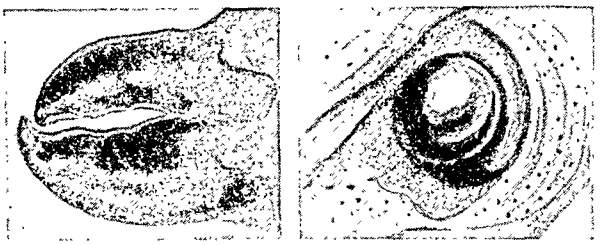
OCTOPUS, CUTTLEFISH, AND SQUID. Tales of horror and imagination have been woven around these strange creatures of the sea since earliest times. The mythical sea serpents which are still reported may possibly be traced to the giant squid, whose arms, 35 feet long, reaching above the surface of the water, assume a snakelike form. The yarns of sailors, fanciful though they may seem, have some basis in fact. For these are among the largest, strongest, fastest, most cunning, and ferocious of all animals.

Most of them, however, are quite harmless and are useful in a variety of ways. In southern European and Asiatic countries, the octopus is valued as food. In North America common squids are used as bait in the cod fisheries. The internal shell of the cuttle-

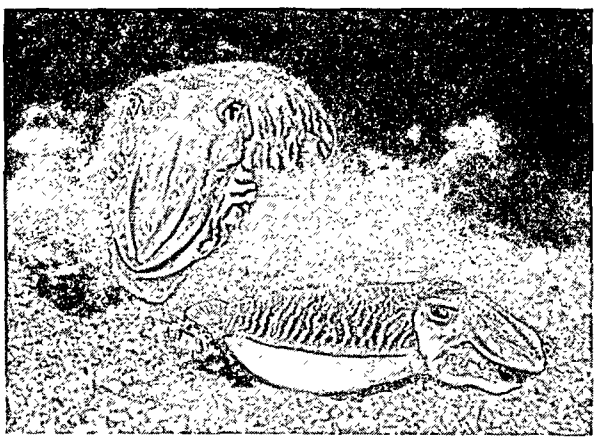


The giant squid is one of the largest and most terrifying animals on earth. From its siphon, between the huge goggle eyes, this creature is shooting a "smoke screen" toward the fleeing fish.

THE UGLY LITTLE CUTTLEFISH



The parrotlike beak of the cuttlefish can crush oyster shells and clamshells as well as crawfish and lobster bodies. The unwinking, strangely human eye seems to have an evil stare.



The cuttlefish is about eight inches long, brown with white stripes and violet fins. It lives in European waters. This picture was made in the Marine Biological Laboratory, Plymouth, England.

fish, known as cuttlebone, is given to cage birds as a source of lime salts. Sepia ink, a rich brown pigment used by artists, is produced from the fluid these animals discharge to protect themselves from their enemies and to help capture their victims.

The Eight-Armed Octopus

An octopus in an aquarium is not a very terrifying object. Its soft bag-shaped body pulses rhythmically like a bellows. Eight long, slender arms, lined with cuplike suckers and connected by thin membranes, reach out in all directions. Over the animal flow waves of color—gray, brown, pink, blue, green, perhaps even an angry red if it is suddenly frightened. It may move over the bottom of the aquarium tank on the tips of its arms as delicately poised and graceful as a ballet dancer. One has the impression of a soft, flexible creature in constant, controlled motion.

About 50 different kinds of octopuses are distributed throughout the oceans of the world. Those on the east and west coasts of North America have bodies only three or four inches long, with short arms about as long as the body. Other kinds reach a total length of nine or ten feet and may weigh 70 pounds.

The octopus dwells on the ocean bottom in shallow waters where it crawls about on its arms, searching in every crevice for its favorite food of shrimps, crabs, and mussels. It is a skillful hunter and attacks such large prey as sharks and dogfish. It stalks a victim until it can drop down on it from above. Then wrapping the arms around it, and with suckers firmly attached, it drags the prey into its powerful jaws. It is the terror of pearl divers in Asiatic waters, where it has been known to hold down a man until he drowned. If the octopus is losing the battle it shoots out a cloud of black ink and hastily retreats. It may lose one or more arms in the fight, but they are soon replaced. Its worst enemies are the savage conger and moray eels.

It is an antisocial creature, living alone in a rocky den. Sometimes it digs its own den, moving stones of considerable size and closing the entrance with stones when it retreats inside. The female lays her eggs either singly or in grapelike clusters, depending on the species. She guards them for as long as 50 days until they hatch, and then leaves the young to shift for themselves.

Ten-Armed Cuttlefish and Squid

Cuttlefish and squid differ from the octopus in having ten arms instead of eight. The fifth pair are much longer than the others. In many species they are set in pits into which they may be withdrawn. They have suckers only at the club-shaped end.

Different kinds of cuttlefish are found near the shores of North America, Australia, and Europe, and some live in the deep sea. The body is shield shaped, eight to ten inches long, with the wide part of the shield at the head end. Flaps along the sides of the body serve as fins.

The food of the cuttlefish consists of fish and various shellfish, such as prawns, shrimps, and crabs. Upon these it steals unseen, grasping them by shooting out the two long arms from their pits. Cuttlefish come into shallow water in July and August to deposit their eggs. They are attached to each other and to the ocean floor by means of gelatinous stalks.

Squids are dwellers of the deep and open seas, unlike the cuttlefish and octopus, which are more commonly found near shores. They are arrow-shaped, with a triangular fin on either side of the end of the body. Those that dwell in deep waters are luminescent. The little sea arrows, or flying squids, are about 12 inches long. As their names imply, they are incredibly swift in motion. They travel in schools. They are abundant off the Atlantic coast of North America.

Giant squids are the subject of most of the legends of deep-sea monsters. Careful observers state that the giant squids off the northeastern coast of America often attain a total length of 55 feet. The arms of such a specimen are 35 feet long, and the body 20 feet long. The weight is nearly a thousand pounds. Each sucker is almost two inches wide, and the eye-opening a foot wide. The giant squid is sometimes called "devilfish," a name which is also given to the largest octopuses and to the manta ray.

Head-Footed Mollusks

It is hard to believe that these creatures are relatives of the garden snail, the slug, the oyster, the scallop, and the clam. Like them, they are mollusks (*see* Mollusks). The octopus, cuttlefish, squid, pearly nautilus, and argonaut, or paper nautilus, comprise

THE OCTOPUS LIVES ALONE



This octopus lives among the coral rocks of the South Pacific Ocean. It is shown at the entrance to a cavern in an exhibit in the American Museum of Natural History, New York City.

the class of *cephalopods* (*sĕf'ą-lō-pŏdz*), "head footed." The head is surrounded by tentacles called arms which are actually modifications of the foot in other mollusks. The pearly nautilus is the only cephalopod which has an external shell enclosing the soft body (*see* Nautilus). All the others have only remnants of shell embedded in the body. The shell-less cephalopods are divided into two groups—the octopus, with eight arms; (*octopod*) and the cuttlefish and squid, with ten arms (*decapod*).

They are the most highly developed of the animals without backbones (invertebrates). There is a distinct head, with a brain and sense organs protected by a brain case of cartilage. The body is enclosed in a thick, muscular fold of flesh called the mantle. It ends in an open edge, the *collar*, which surrounds the neck. Between the inside of the mantle and the trunk of the body is the *mantle cavity*.

Attached to the underside of the head is a funnel, or siphon. It extends back into the mantle cavity. Through the funnel are expelled the body wastes, the eggs, and the fluid from the ink sac. Water entering the mantle through the funnel carries oxygen to two comblike gills by which the animal breathes. The funnel is also the chief organ of locomotion. When the mantle is relaxed, water flows into the mantle cavity through the open edge of the collar. If the animal wants to move quickly it suddenly contracts the muscles of the mantle; the collar seals tightly; and the water in the mantle cavity shoots out through the funnel. This jerks the animal rapidly backward, and it moves in a succession of jerks, arms trailing behind. If it wants to move *forward* to seize its prey, it bends the funnel *backward*. These animals were the originators of jet propulsion (for picture, *see* Jet Propulsion).

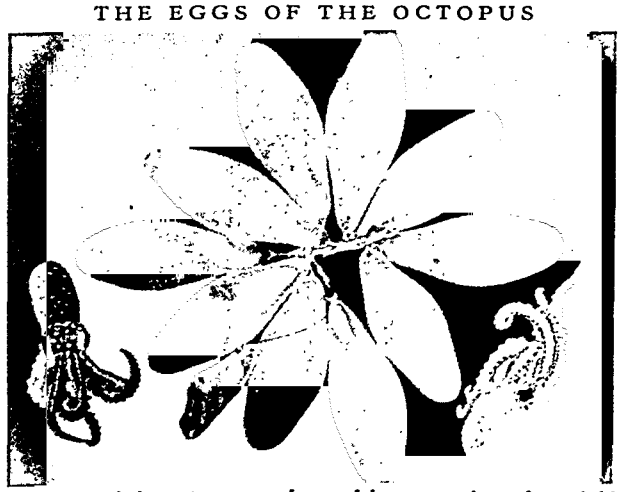
The head is partly concealed by the bases of the arms. Inside the circle of the arms is the mouth. All cephalopods are carnivorous—that is, they live on other animals of the sea. They catch their prey with the arms and transfer the food to the mouth. The mouth is surrounded by a ring-shaped lip. Inside the lip is a sharp, parrotlike beak. In the throat are the tongue and radula. The radula is a sharp, horny ribbon that lies on the upper surface of the tongue. As the tongue moves back and forth, chunks of food cut by the jaws are ground to bits.

The large, lidless, unblinking eyes are amazingly like the eyes of human beings and totally unlike those of any other invertebrate. A pair of pits behind the eyes are probably organs of smell.

The tentacles, or arms, are lined with a double row of suckers for the entire length of the inner surface. Those of the octopods are attached directly by the base to the arm. In the decapods the suckers are raised on a short stalk. Each sucker ends in a horny ring which in some species is also saw toothed. When a cuttlefish or squid attaches itself to an object, a powerful vacuum is created between the ring and the floor of the pit in each sucker.

The sexes are separate. With one arm, the male grasps a sperm capsule from its funnel opening and transfers it to the mantle cavity of the female. In certain octopuses the arm becomes detached and remains for a time in the female's mantle cavity. A new arm grows to take its place. In some squids, the female takes the eggs from her funnel opening and places them in a special cavity in her mouth; then the male places the sperm capsule in the same cavity. The fertilized eggs are ejected through the female's funnel or from her mouth. They hatch into a small form of the adult.

THE EGGS OF THE OCTOPUS



The eggs of the octopus are incased in a capsule and are laid in a cluster. Two tiny animals have just hatched, and others may be seen inside the transparent capsule.

ODESSA, RUSSIA. The train rolls through mile after mile of oats and barley and waving fields of golden corn or wheat until it comes abruptly to the end of the steppe, between the two great rivers, the Dniester and the Dnieper. There on the brink, looking out over the Black Sea, stands Odessa, an important port of the Ukrainian Soviet Socialist Republic.

Along its tree-arched avenues and broad boulevards are magnificent houses which were once the homes of the rich and noble, but are converted now into workmen's tenements, communist clubs, or government offices. Mineral waters and mud baths near the city attract health seekers.

Odessa's recent history has been marked by disaster and tragedy. Before the first World War it had been the commercial capital of South Russia and one of the world's busiest seaports, handling Russia's vast grain exports. The revolutionary fighting of 1917–20 laid large parts of the city and its suburbs in ruins, and later famine years brought terrible suffering. In the autumn of 1941, during the second World War, the German army captured Odessa after heavy fighting. In 1944 it was back in Russian hands, and by 1950 the war damage had been largely repaired.

Most of the ships that crowd Odessa's harbor are engaged in coastal service, since the Soviet Union now has little contact with the outside world. The chief industries are agricultural machinery, fish canning and other food processing, and the production of salt from seawater in evaporation pans.

Catherine the Great founded the city on the site of an old Turko-Tatar village in 1794, as a stepping-stone toward Constantinople (Istanbul). Population (1947 est.), 600,000.

ODIN. When the long dark winter evening settles down on the Northland, the children gather around a great pine-log fire and listen to grandmother's wonder tales of Odin, father of the gods of Scandinavian mythology.

Many, many years ago, the story runs, there arose from the center of the earth a lofty mountain, so high that it reached to the clouds. On the top of this mountain was a beautiful green plain, in the midst of which stood the shining city of Asgard, home of the gods. Chief among these gods was Odin (sometimes called Woden), who sat on a golden throne in the center of the plain, and directed the wind, the rains, and the seasons. On Odin's head was a shining helmet, and in his hand he carried a spear made from a bough of the great ash, Ygdrasil, the tree of life. Over his shoulders was thrown a beautiful mantle, the color of the summer sky, and this was trimmed with twinkling stars, for Odin was the god of the heavens. At his feet lay two wolves which he fed from his hand, and on his shoulders perched two ravens who each morning flew over the earth and brought back news of what was going on in the world.

Though Odin ruled over the heavens, the earth, and the underworld, there was one place that he could not control. This was Jotunheim, the home of the frost giants, a dreary frozen country that lay to the north beyond the seas. These giants waged unceasing warfare against the gods and men, and Odin longed for the wisdom that would make him greater than any of the giants and enable the gods to triumph over them.

The only way in which this wisdom could be acquired was by drinking from the fountain of knowledge. This Odin decided to do, and mounting his eight-legged steed he crossed the rainbow bridge that connects the heavens with the earth. At the end of the bridge stood Ygdrasil, whose roots and branches bound together underworld, earth, and heaven. This tree was always green and its leaves never withered, for its roots were watered by a stream from the fountain of knowledge which gushed forth at its foot.

He Gives an Eye for Wisdom

Mimir, an old, old giant with snowy beard, guarded the sacred fountain, and none without his consent could drink of its waters. When he saw Odin approaching he said.

"What does the father of the gods seek so far from sunny Asgard?"

"I have come to beg a draught from your well, O Mimir," answered Odin.

"Whosoever drinks from this fountain," said Mimir, "must be willing to give much in return."

"I will give whatever you ask," replied Odin. So Mimir handed him a drinking horn, saying:

"Drink, then, and the wisdom of the ages shall be yours; but you must leave me one of your eyes."

Odin thereupon drank, and forfeited his eye; and ever after there was no one in all the worlds who could compare with him in wisdom.

Though Odin was really the god of the heavens, he was ruler of the earth as well, and it was he who created men and put them on the earth, teaching them to fish, hunt, and till the soil. Being a warlike god he also taught them to fight gloriously in battle, and he sent his messengers, the Valkyries, to lead the souls of the hero dead to Valhalla, the hall in heaven of the gloriously slain. Here the departed warriors lived, reveling in those joys which had been dearest to them on earth, fighting bloody battles by day and feasting by night, their wounds healing at once.

How Wednesday Got Its Name

When the ravens would return from their flight over the earth, they would tell Odin of hard-fought battles and of brave deeds of heroes. Sometimes they brought news of the swarthy elves who lived under the earth, making wonderful things from gold, silver, and brass; and sometimes they told him that Midgard, the great serpent who encircled the earth, was lashing the waters with his tail, turning the seas into foam and rolling up great waves that threatened to cover the land. So Odin lived, ruling the world wisely and kindly. In his honor the fourth day of the week is still named Wednesday, or "Woden's day." Odin is sometimes identified with the Roman Mercury, which explains why the French call the fourth day of the week "Mercury's day" (*mercredi*).

RULER OF THE NORTHERN GODS



Our Northern ancestors worshiped Odin. From a throne carved in dragon heads he ruled the realm of the gods and the haunts of men. At his shoulders flew the black ravens, Huginn (Thought) and Muninn (Memory), who informed him of all things.

The Story of ODYSSEUS *and the* ODYSSEY



Odysseus, hero of the adventures of the Odyssey, bids farewell to his wife Penelope and his son Telemachus. Argos, Odysseus' dog, gazes at the ships. These pictures were drawn for this article by Steele Savage.

ODYSSEUS (*ō-dĭs'ūs*). According to Greek legend one of the greatest of the Greek heroes who warred against the Trojans was Odysseus (later called Ulysses by the Romans). He was king of Ithaca, a small island off the west coast of Greece. When summoned to join his brother chieftains in the war he could not bear to leave his fair young wife Penelope and his infant son Telemachus. So he pretended to be insane.

To convince everyone of his madness, he plowed the sand along the seashore as though it were a field. But Prince Palamedes, who came for him, recognized this as a trick. To prove it, Palamedes laid little Telemachus in the path of the plow. When Odysseus quickly turned the plow aside to avoid striking the child, all saw that his madness was make-believe. And since Odysseus could no longer refuse to go to the war, he lent his aid in getting other reluctant chiefs to go. Among them was the great Achilles (*see* Achilles).

Odysseus fitted out 12 ships and started for Troy. During the war he earned the title "the crafty Odysseus," for it was he who thought of the plan of building a great hollow wooden horse, inside of which he and many other Greek warriors could hide themselves. The stories of how this horse was taken through the gates of Troy and of the Greek victory that followed are told in the article on the Trojan War.

Ten years had passed since Odysseus had left Penelope and Telemachus. So filling his ships with treasure taken from the Trojans, Odysseus eagerly set sail. The men on the benches rowed hard for they too were anxious to get home. Now the journey from Troy to Ithaca would ordinarily have taken only a short time. But the Greek gods willed that it should be ten more years before Odysseus could land on his native soil.

The exciting story of his long wanderings and his many adventures is told in the great epic poem, the 'Odyssey', written by the Greek poet, Homer, more than 2,500 years ago (*see* Homer). Though many centuries old, the story is so thrilling that it is still read eagerly even in prose translations. T. E. Lawrence, who did one of the most recent translations, called it "the oldest book worth reading for its story, and the first novel of Europe." Homer devoted 24 books to its telling. Only the barest outline of the various adventures can be given here.

The Story of the Odyssey

SOON after Odysseus and his men left Troy they ran into a raging storm. For nine days winds drove the ships like leaves, past Ithaca and far off their course. On the tenth day they reached the land of the Lotus-Eaters. When Odysseus sent a party to search this land the men ate of the lotus. This magic food made them forget all longing for home. But Odysseus had them dragged to the ships and again they set sail.

So sailing, they came to the island of the Cyclopes —a race of fierce one-eyed giants. The ever-curious Odysseus set out with 12 men to explore the island, and they entered the cave of Polyphemus, most ferocious of the Cyclopes. There Polyphemus kept them

prisoners and devoured six of the men. Apparently all faced the same horrible fate. But while Polyphemus slept, Odysseus took a piece of the giant's staff and sharpened it. This he heated red-hot and burned out the giant's single eye. Odysseus and his men then tied themselves underneath some sheep who were in the cave, and so escaped. The article on the Cyclopes tells the story of this escape. It also relates how Poseidon, god of the sea and father of Polyphemus, avenged the blinding of his son.

Aeolus, Keeper of the Winds

Not long after, Odysseus and his men reached the Aeolian Isle, a peaceful land where Aeolus, Keeper of the Winds, dwelt. There for a full month they were entertained. As a parting gift, Aeolus gave Odysseus a favorable west wind to speed them on their way. All the other winds he bound into a leather bag and put the bag aboard Odysseus' ship.

For nine days the ships sped over the waters until the beloved shores of Ithaca were sighted. Exhausted, Odysseus fell asleep. Now the crewmen believed the bag which held the winds was full of gold and silver and they seized this chance to open it. Instantly the winds burst forth and drove the ships straight back to the Aeolian Isle. But Odysseus and his men were not welcomed this time. Instead, Aeolus drove them off, saying that men so unlucky must be hated by the gods (*see* Aeolus).

And hated, Odysseus and his men truly seemed to be. For when they beached at the land of the Laestrygones after a week of hardships, they found themselves in a country of cannibals. Giantlike men hurled great rocks and shattered the ships. So perished 11 of the ships with their full crews. Odysseus was able to save only his own ship with its men.

Outwitting Circe and the Sirens

Sailing in this remaining ship, the party touched next at the island home of Circe, the enchantress. Circe cast an evil spell upon Odysseus' men and changed them into swine. But Odysseus, who came later, was protected from Circe's enchantment by the flower of a magic herb called moly, which Hermes, messenger of the gods, had given to him. Circe recognized Odysseus as the one of whose coming Hermes had spoken. She quickly changed the swine back to men and gave them such rich food and drink that they stayed on in her palace for a year (*see* Circe). When Odysseus again determined to leave for Ithaca, Circe said he must first journey to the House of Hades, where dwelt the dead. There he must seek counsel of the spirit of the prophet Teiresias.

It was a silent shipload of men, full of dread, who followed Circe's directions to the world's edge and thence to the dark House of Hades. There the spirit of Teiresias came to them and told of the many perils still ahead. Yet, said Teiresias, there was a chance of their reaching home. But they must curb their greed when they came to Thrinacia where Helios, the sun-god, pastured his herds. If they should harm but a single beast, the ship and its men were doomed.

Subdued by this warning they resumed their journey. They had to pass the flowery meadows where the



The blinded Polyphemus hurls a mountain top at the ships of Odysseus. He misses and the ships sail safely away, while Odysseus stands at the prow of his ship and jeers at the giant.

sister-Sirens were. The Sirens were wicked sea nymphs, whose singing beguiled men to certain death. Yet so enchanting were their songs, no man could resist listening. Fortunately Circe had warned Odysseus. He filled the ears of his men with wax so that none could hear. Because he himself wished to listen, Odysseus kept his own ears open but, as a safeguard, he had himself bound tightly to the mast. So, safely, they passed the Sirens and their entrancing voices, the men rowing stolidly while Odysseus strained in vain to free himself.



Odysseus sends his arrow through holes in the ax blades. The suitors who had failed to bend the bow watch in dismay.

Charybdis, Scylla, and Calypso

This danger past, Odysseus was unbound and the sailors' ears were unstopped. Now a fresh peril loomed ahead. Their ship had to go through a narrow strait between two towering cliffs. On one side breakers thundered furiously and the wild white spray of the sea rose heavenward like smoke. There sat the huge-mouthed Charybdis, sucking down the sea and belching it forth again into a fearful whirlpool. On the other side of the strait, Scylla, a loathsome six-headed monster, waited in her cave to snatch the mariners who passed. So narrow was the passage that no ship could escape both dangers. Odysseus urged his oarsmen to a burst of speed and they safely passed Charybdis and her deadly whirlpool. But suddenly the hideous long-necked heads of Scylla appeared. Seizing six of the sailors she bore them shrieking from the ship and swallowed them.

After this terrible encounter, they were glad to see the Island of the Sun. Here, upon wide and peaceful meadows, the cattle of Helios, the sun-god, grazed. Mindful of Teiresias' warning, Odysseus wished to sail past. But his men feared the night seas and Odysseus finally agreed to land. First he made them swear that they would not slaughter a single beast.

That night storm clouds gathered and for a month winds held the men on the island. Finally their food ran out and they faced starvation. While Odysseus slept, they broke their vow and killed the choicest cattle. Six days they feasted. Then the winds suddenly quieted. Grateful for their apparent escape from punishment, the men sprang aboard their ship and headed for the open sea. But Zeus had heard the sun-god's prayer for vengeance. He sent a great hurricane that tore the ship apart and pitched the crew into the dark waters. For a few moments Odysseus saw them struggling. Then he alone was left, clinging to the mast. For nine days and nights he drifted. On the tenth night he was cast ashore on Ogygia, home of Calypso, the gracious sea nymph. Here his strength was restored. Yet he was little more than a prisoner, for Calypso loved him and refused to let him go, desiring that he stay forever so she could make him immortal like herself. For more than seven years he had to remain, wasting away with longing for his beloved wife and son.

Release of Odysseus

At last the goddess Athena, always the defender of Odysseus, got Zeus to promise his release. Hermes, Zeus's messenger, carried the word to Calypso. Obediently she set about aiding Odysseus. She gave him tools to make a raft and gave him cloth for sails. Then with a high heart Odysseus set sail upon his raft. For 17 days he sailed calm seas. On the 18th day great winds arose and the seas raged. The raft was split apart, and Odysseus was tumbled into the water. Only by powerful swimming was he able to make shore and find himself a hiding place. Then he fell into a deep and healing sleep.

The land to which he had come was the kingdom of the Phaeacians. Here reigned Alcinoüs the Generous and his noble wife Arete. The very next morning their daughter Nausicaä, a fair young princess, came with her maidens to the beach close to Odysseus' hiding place. When Nausicaä flung a ball into the river, the shrieks of the maidens woke Odysseus. He strode forth covering himself with a leafy bough for the sea had torn his garments from him. His wild appearance frightened the maidens and they fled. But fearless

Nausicaä remained. She had Odysseus fed and clothed, then directed him to her father's palace.

Bathed, fed, and rested, Odysseus glowed again with manly grace. He strode into the king's glittering palace where he was treated with great kindness. In his honor there was feasting and there were contests of strength. The king promised to fit out a ship to take him home. But it was not until he was moved to tears by a blind minstrel's songs of the Trojan heroes that Odysseus yielded to the king and told him who he was. Then, while all listened in wonder, he related the long tale of his adventures. The next day the Phaeacians loaded a ship with treasure. Skilled men plied the oars to carry Odysseus to Ithaca.

Odysseus Returns Home

So at last the wanderer came home. The goddess Athena gave him news of his household and helped store his treasure in a cave. Then she changed his appearance to that of an old beggar. It was not wise for Odysseus to appear suddenly as a king for, during his 20 years' absence, others had coveted his kingdom and the hand of his wife Penelope. A great number of these suitors were staying in Odysseus' palace, wasting his wealth and trying to force Penelope to choose one as her husband. His son Telemachus, now grown to manhood, had vainly tried to get rid of them. Penelope had put them off by insisting she could not marry until she had finished weaving a shroud for Laertes, aged father of Odysseus, who was near to death. What she wove by day she unravelled by night so that the garment was never finished. Servants finally gave away her secret and from then on she had no peace.

Odysseus, in his beggar's disguise, found shelter in the hut of Eumaeus, his former swineherd. Here Telemachus appeared, having outwitted the suitors' plans to kill him. Odysseus revealed himself to his son and together they planned vengeance. Then Telemachus returned to the palace, leaving the make-believe beggar to follow. As Odysseus was on the way to the palace, an old dog, lying in the path, lifted his head and pricked up his ears. It was Argos, Odysseus' own hound, now grown feeble with age. Argos was too weak to draw nearer but, faithful to the end, thumped his tail in joyful greeting. Then his loyal heart stopped beating.

Still acting the part of a beggar, Odysseus arrived at the palace. As he passed among the suitors they ridiculed and insulted him. But Penelope, though she did not recognize him, had a bath and bed prepared. For she would permit no stranger, however humble, to be ill-treated. Overnight Penelope sadly decided to choose one of the suitors. Next evening she appeared carrying the great bow of Odysseus and his quiver full of arrows. Then she announced that she would marry the man who could bend the bow and send an arrow through holes in the blades of 12 axes set in a row.

One suitor after another tried and could not even bend the bow. Suddenly Odysseus, still clothed as a beggar, asked to test his strength. The suitors raged at the idea, but Telemachus had Eumaeus give him the bow. First Odysseus ran his hands over it to make sure that no worms had weakened it. Then he bent the mighty bow and plucked the bowstring till it sang out like a swallow. Snatching an arrow, he sent it flying, straight and true, through the 12 ax blades. After Odysseus had shown who he was, Telemachus, spear in hand, leaped to his side. Then began the slaughter of the suitors, for Odysseus shot arrow after arrow and every one found its mark. Telemachus and Eumaeus fought bravely, as did a second servant who was keeper of the cattle. So at last was every suitor slain—the kingdom of Ithaca regained—and Odysseus the king reunited with his family. (Versions of the 'Odyssey' for younger readers are listed in the bibliography for Mythology.)

OEDIPUS (*ĕd'ĭ-pŭs*). Perhaps the most tragic hero in Greek legend is Oedipus, king of Thebes. His father Laius, king of Thebes, learned from an oracle that his own son should kill him. He therefore pierced and bound the feet of the new-born babe and had him left to die on Mount Cithaeron. But a kind-hearted shepherd found the child and named him "Oedipus," meaning "swollen foot."

The child was brought to the king of Corinth who reared him as his son. When Oedipus was grown an oracle told him he was to kill his father and marry his own mother. To escape this fate he left home, for he believed that the king of Corinth was his father.

On his way to Thebes, he met a chariot in which sat an aged man. An attendant who preceded it rudely ordered Oedipus out of the way and a combat followed. Oedipus slew both master and servant. So the first part of the oracle was fulfilled, for the man was Oedipus' real father, King Laius.

About this time a terrible Sphinx appeared near Thebes. This monster asked all who passed a riddle and forced them to guess it or be devoured. The Thebans offered the throne and the hand of Queen Jocasta to whoever should overcome the monster.

"What animal," asked the Sphinx when Oedipus confronted it, "walks on four legs in the morning, on two at noon, and on three at night?" Oedipus quickly replied: "Man, for in the morning, the infancy of his life, he creeps on all fours; at noon, in his prime, he walks on two feet; and when the darkness of old age comes over him he uses a stick for better support as a third foot." Thereupon the Sphinx dashed herself over the rocky precipice and perished.

Oedipus became king and was married to his mother Jocasta. This fulfilled the second part of the oracle. Soon the country was devastated by a terrible plague. The oracle promised relief when the murderer of Laius should be banished. Oedipus then learned that he had killed his father and married his mother. In horror he put out his eyes, while his mother hanged herself. A blind and helpless outcast, Oedipus wandered away with his faithful daughter Antigone. She cared for him until he died.

The Greek dramatist Sophocles tells the story of Oedipus and his children in the great trilogy of 'Oedipus the King', 'Oedipus at Colonus', and 'Antigone'. In this last play he gives a beautiful picture of the noble character of the heroic maiden.

OGLETHORPE, JAMES EDWARD (1696–1785). One of the great philanthropists in early American history was the British general, James Edward Oglethorpe. He founded the Georgia colony as a haven for imprisoned debtors and oppressed Protestant minorities.

Oglethorpe was the son of a wealthy baronet. He was born Dec. 22, 1696, and educated at Eton. In a war against the Turks (1716–17), he was praised for his services at the siege and capture of Belgrade. In 1722 he was elected to parliament.

His sympathies were aroused by the absurd practise of imprisoning English debtors and by Europe's oppression of dissenters from established churches. He suggested they be helped to make a new life in America. They could also be placed as a buffer between the English settlers in the Carolinas and the Spaniards in Florida. His arguments won a charter for the Georgia colony in 1732.

Oglethorpe settled Savannah early in 1733. He made friends of the Indians and drove back several Spanish invasions. He led two futile attacks on Spain's St. Augustine settlement and spent his own money on the colony's defenses. But his rules limited drinking and forbade Negro slavery, and some of the colonists became discontented.

A subordinate charged Oglethorpe with mismanaging the St. Augustine expeditions, and in 1743 he had to return to England to stand trial. A court martial vindicated him. Oglethorpe remained in England. He married an heiress, and in 1745 helped put down a Scottish rebellion. Another court martial freed him of charges arising from this campaign.

BERNARDO O'HIGGINS



He helped win Chile's freedom and was its first official head.

Meanwhile the colony trustees became discouraged and surrendered the charter in 1752. Georgia became a royal province. Oglethorpe stayed in England and died at Cranham Hall, Essex, on July 1, 1785.

O'HIGGINS, BERNARDO (1778–1842). The dictator of Chile's first independent government was Bernardo O'Higgins. As a soldier he brilliantly led Chilean soldiers in the battles for independence. And as a statesman he was the first national leader in either North or South America to abolish Negro slavery.

Bernardo was the son of Ambrosio O'Higgins, an Irishman, and an aristocratic Chilean mother, Isabel Riquelme. He was born on Aug. 20, 1778, in the town of Chillán, in Chile. His father was Spain's governor for Chile, 1789–95, and viceroy for Peru, 1796–1801. When Bernardo was 16 his father sent him to Europe. In Spain Bernardo met José de San Martín, later the liberator of Argentina. In England he met Francisco de Miranda, a Venezuelan revolutionary leader.

In 1802 Bernardo returned to Chile and took up the life of a rich planter. He was a serious, puritanical, and unselfish young man. He joined the militia and rose to colonel. When Chile rebelled against Spain in 1810, he offered his services. The Spaniards were driven out. When a new Spanish force invaded Chile, he was made commander of the revolutionary army. Because reinforcements failed him, O'Higgins lost the battle of Rancagua in 1814. He fled over the Andes. Under San Martín, O'Higgins came back to win Chacabuco and Maipo, the battles that secured Chilean independence (*see* San Martín).

Chile's provisional government offered a dictatorship to O'Higgins. As dictator he helped San Martín build forces to fight Spain in Peru. O'Higgins' liberal rule was disliked by the Chilean aristocrats, and in 1823 he was forced to resign (*see* Chile).

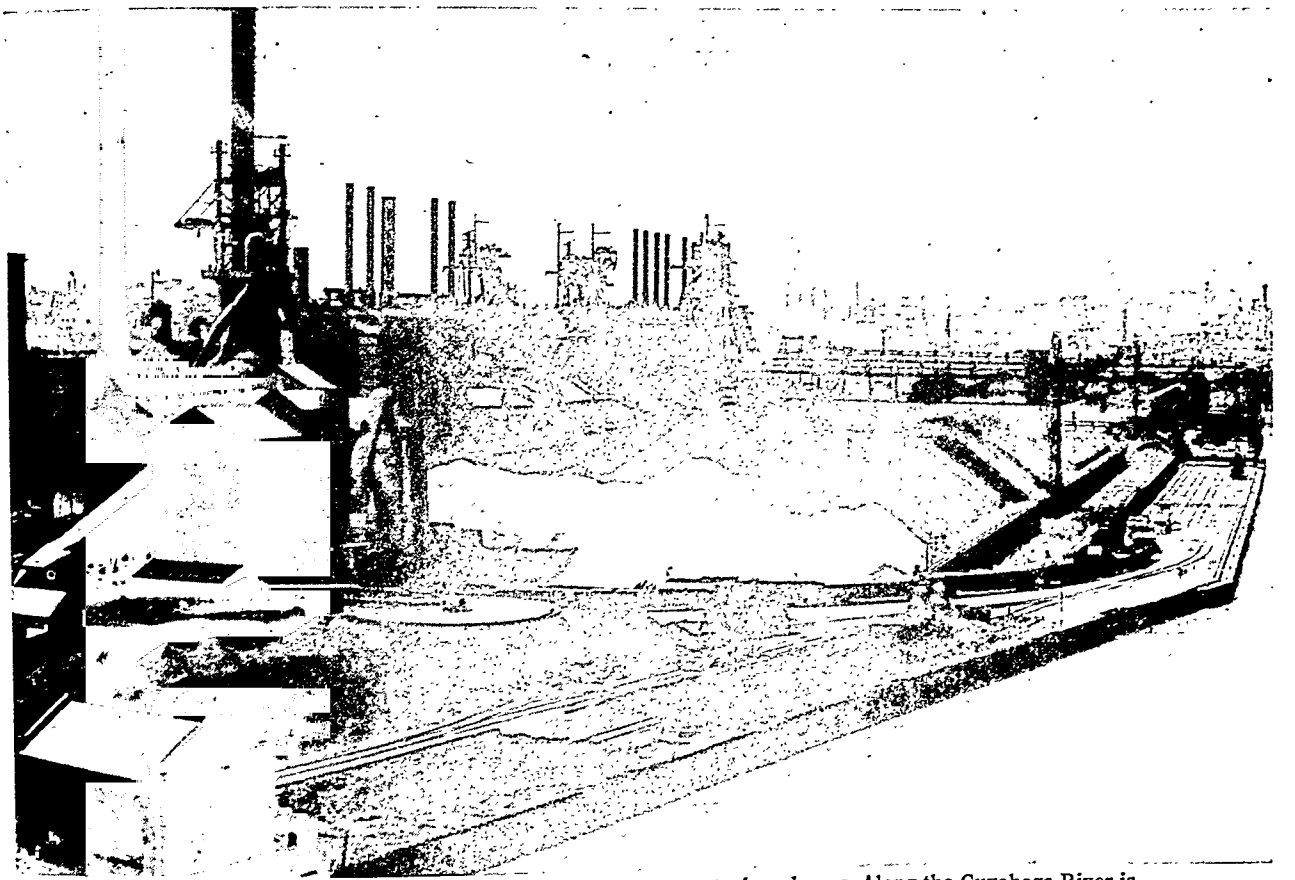
Peru offered him asylum, and O'Higgins, with his mother and sister, took up residence there. In 1839 a new Chilean government restored O'Higgins' title of captain general and asked him to return. But O'Higgins was ill. He died Oct. 24, 1842.

OGLETHORPE MAKES A TREATY WITH THE CHEROKEES



Here Oglethorpe, the founder of Georgia, accepts a pledge of peace from a Cherokee chief. The pledge is a buffalo hide bearing a painted eagle. Oglethorpe made friends with the Indians, and they helped the English colonists when the Spaniards raided Georgia settlements.

OHIO—*a Panorama of* MODERN INDUSTRY



Cleveland, Ohio's largest city, is one of the world's great steel producers. Along the Cuyahoga River is the industrial area, called The Flats. In the background is Terminal Tower, Ohio's tallest building.

OHIO. Hundreds of millions of years ago, the region that is now Ohio was marked out by nature to become a rich and populous state. Beneath the earth's surface, tremendous natural forces formed seams of coal, pockets of petroleum and natural gas, and beds of clay and limestone. All these were destined to become raw materials for great mining and manufacturing industries. Much later, a huge ice sheet extended over all but the southeastern part of the state. It left behind the deep fertile soil that now gives Ohio its prosperous farms.

To the north of this region is Lake Erie, with its connecting links to the Atlantic seaboard. To the northwest are the iron ore deposits of the Lake Superior area. To the south is the broad Ohio River, offering a water highway leading to the Mississippi and the Gulf of Mexico.

Through the development and use of these natural resources, Ohio has become one of the leading industrial states in the nation. It ranks high in both manufacturing and mineral production. At the same time it has kept its position as an important agricultural state. Although it ranks only 34th in size, it is fifth among the states in population.

Ohio was the first state carved out of the old Northwest Territory. It was settled by pioneers from the older states and by immigrants from many European lands. Seven of Ohio's sons have been presidents of the United States—Ulysses S. Grant, Rutherford B. Hayes, James A. Garfield, Benjamin Harrison, William McKinley, William Howard Taft, and Warren G. Harding. Many other Ohioans have taken important parts in the nation's affairs.

The people of Ohio take an active interest in their state. This interest is shown in the state's excellent educational system, which includes fine primary and secondary schools and about 50 colleges and universities. It is also demonstrated in the state's political institutions. Ohio cities have "home rule," which allows them to frame their own charters, and to choose their local form of government—mayor-council, commission, or city-manager.

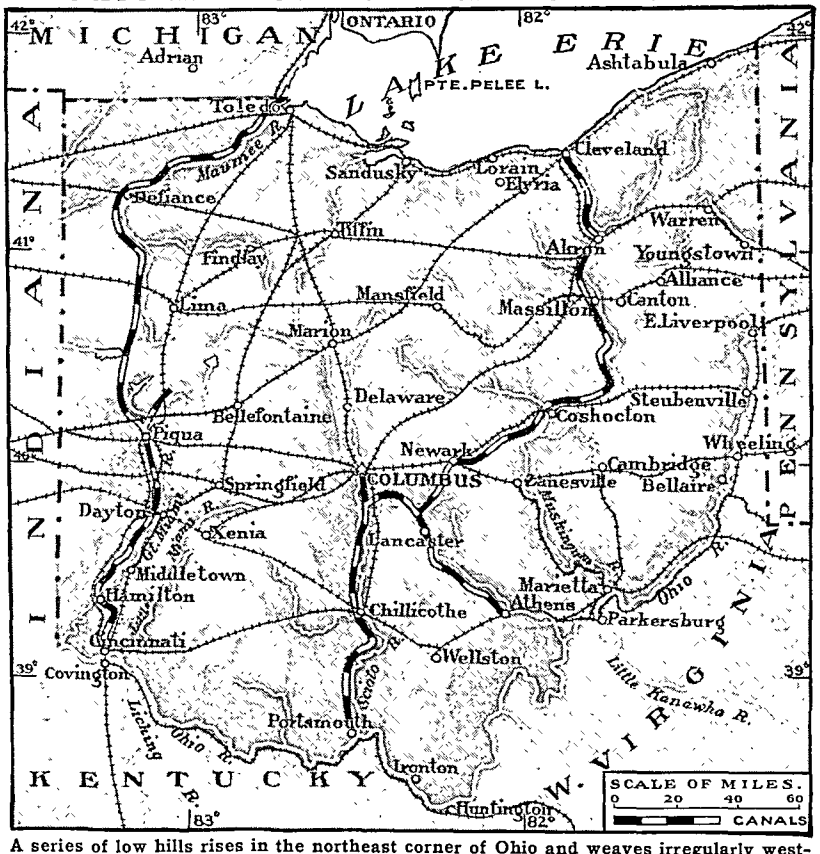
Geography of the State

In preglacial times northern and western Ohio had been covered by a network of river gorges and valleys. During the Ice Age, the Wisconsin ice sheet spanned the greater part of what is now Ohio. The ice ground down hills; and when the glacier withdrew, it left vast deposits of glacial mud and gravel. The deposits choked the ancient river valleys, and today the rivers flow in channels that are sometimes a hundred feet or more above their preglacial beds. A completely buried river channel, more than 500 feet deep, has been discovered near St. Paris.

Glacial deposits and grinding off of hills formed a relatively level plain. Glacial soil covers three-fourths of Ohio, including its best farm lands. The unglaciated soil is fertile where it has a limestone base or where it lies in the flood plain of a river. Otherwise this type of soil makes poor farm land. The state's valuable clay deposits are also partly of glacial origin. Near these deposits are located the state's pottery and china industries.

The southeastern rim of the state was untouched by the glacier. It descends gradually from the Allegheny Plateau region, and is hilly and rugged, just as the whole Ohio area was before the Ice Age. This southeastern part was relatively undeveloped until coal was discovered there. Coal mining began in the region in about 1833.

OHIO AND ITS MANY THRIVING CITIES



A series of low hills rises in the northeast corner of Ohio and weaves irregularly westward to the Grand Lake area southwest of Lima. These hills divide the state into two drainage basins. North of this divide is the narrow Great Lakes sector where all streams flow into Lake Erie. South of this divide the rivers flow into the Ohio River. Between 1830 and 1850 the canal systems shown by the map played an important part in the state's transportation. Today they are abandoned or little used.

The Lake Erie border is made up of level plains. A line of low hills runs from the northeast corner westward to the Indiana boundary. The streams north of the hills flow into Lake Erie, and the streams south empty into the Ohio River. The main rivers are the Maumee, Muskingum, Scioto, and the two Miamis.

Indian Travel Routes Served the Pioneers

For hundreds of years, Ohio has been criss-crossed by travel and transportation routes. The Indians traversed it in their wanderings, and the first white pioneers crossed its rolling expanse on their westward movements. They crossed the eastern mountains and then followed the river valleys or the lake shore. Wherever a water route was available, they built boats or rafts to carry themselves and their goods.

In Ohio, land and water routes were mainly on or near Lake Erie or the Ohio River and its tributaries. These routes were used by the early white settlers on their way to the Old Northwest. Through New York State to Lake Erie, then westward along its shore, came New Englanders. Pennsylvanians set out at the headwaters of the Ohio in their own state. They followed its course into the lower Ohio basin. Virginians and Carolinians passed from the valley of the Shenandoah through the mountain gaps into Kentucky. From there they and Kentuckians proceeded into southwestern Ohio.

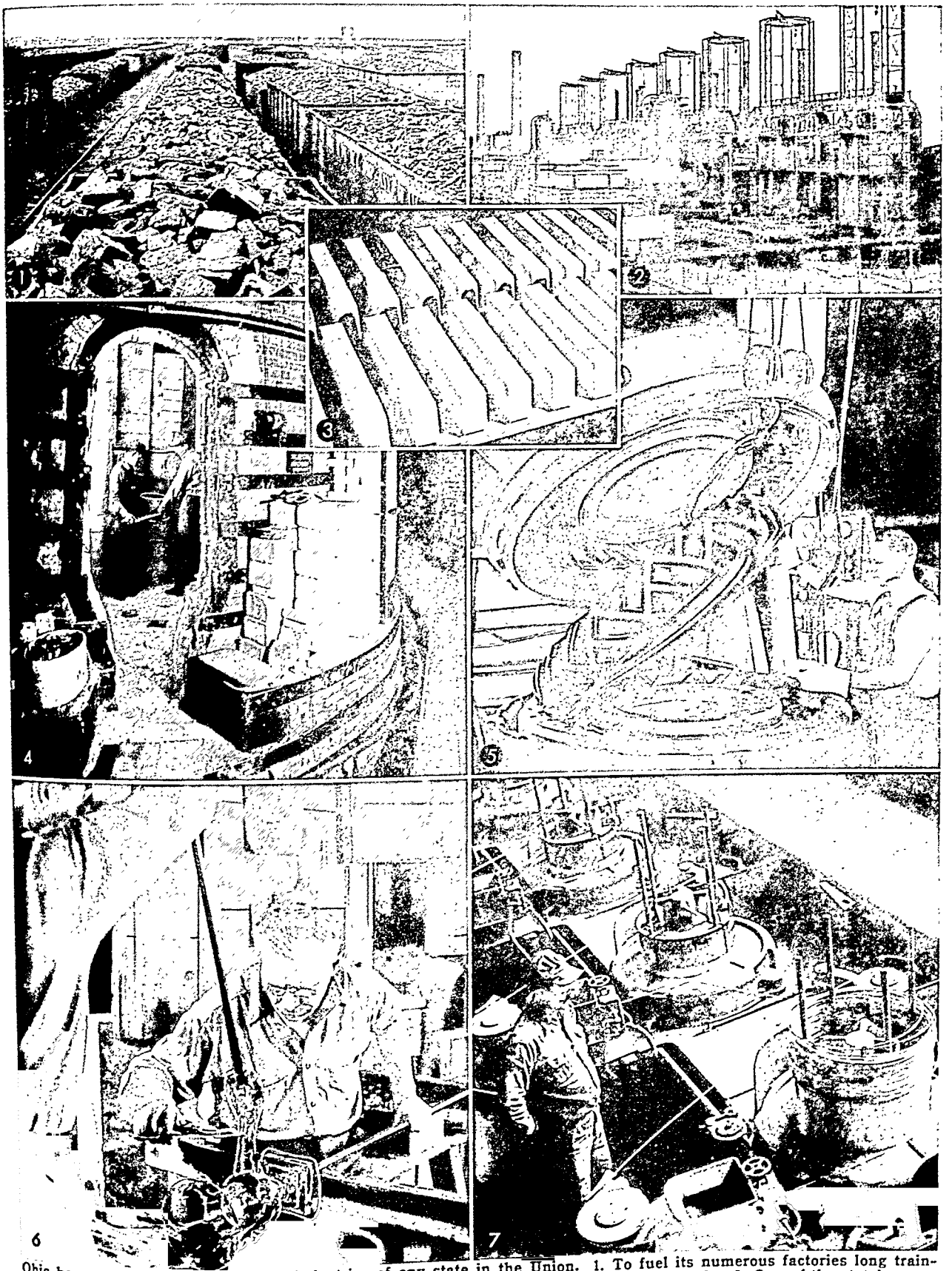
These natural transportation routes drew people into the region until by 1830 Ohio had attained a rank of fourth among the states in population. Although the forests that covered Ohio in the early days had to be cleared before men could farm the land, settlers did so gladly because the region offered growth and prosperity.

Canals, Highways, and Railroads

When New York State completed its Erie Canal in 1825, Ohio enthusiastically followed the example of the older state. In 1827 Ohio opened the Ohio and Erie Canal. This waterway linked Portsmouth on the Ohio River and Cleveland on Lake Erie. The canal contributed much to Cleveland's growth because the city could now serve as a port for all lake and river traffic in the Middle West. Toledo's growth similarly dates from the completion of the Wabash and Erie Canal in 1843 and the Miami and Erie Canal in 1845. These canals connected Toledo by water with Dayton and Cincinnati. Meanwhile, in 1841, the Muskingum River had been made navigable by means of dams and locks. The completion of these waterways joined the interior of Ohio with both New York and New Orleans.

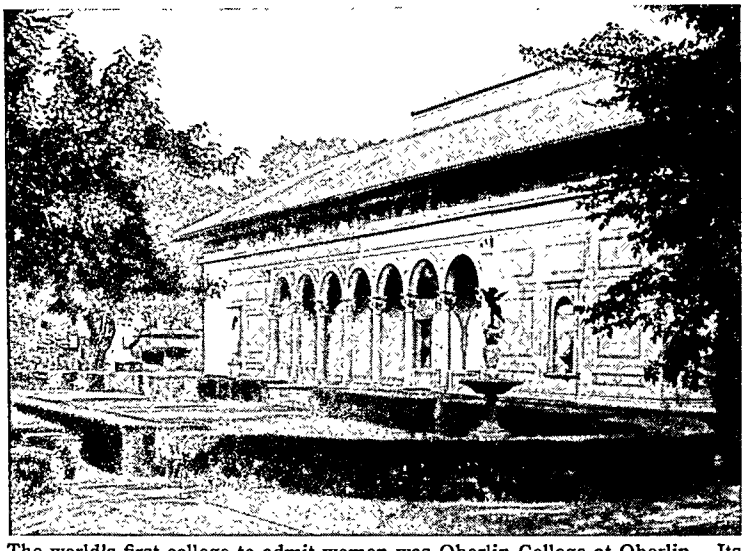
The Federal government greatly aided the growth of land transportation in the state when it ordered the construction of the National Pike westward from Cumberland, Md. By 1838 the road had passed through Zanesville and Columbus and reached Springfield in western Ohio. Later the road was extended across Indiana to Vandalia, Ill. Conestoga wagons

GLIMPSES OF OHIO'S INDUSTRIAL LIFE

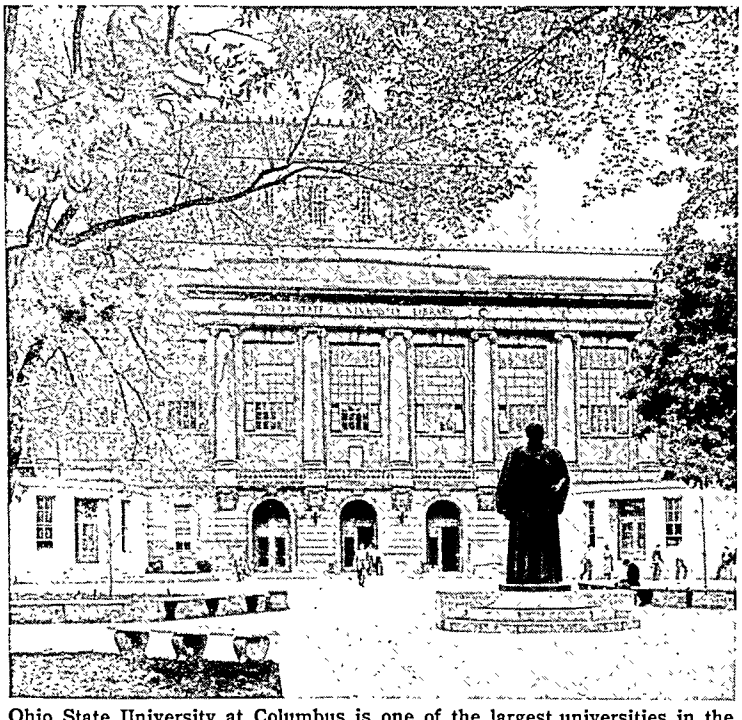


Ohio has, perhaps, the most varied industries of any state in the Union. 1. To fuel its numerous factories long trainloads of coal move through the state, as we see in this picture of the Toledo railroad yards. 2. One of the state's many petroleum refineries. 3. Cakes of soap from a huge factory near Cincinnati. 4. In kilns like this one much of Ohio's pottery is made. 5. A tractor tire coming from a mold in Akron, 6. Glassware is one of Toledo's important products; here a skilled worker is shaping a decorative urn. 7. Drawing out stainless steel wire in a Cleveland steel works.

SEATS OF CULTURE AND LEARNING



The world's first college to admit women was Oberlin College at Oberlin. Its Allen Museum of Art houses collections of fine, Oriental, and applied arts.



Ohio State University at Columbus is one of the largest universities in the nation. Here is its library, built in French Renaissance style in 1912.

and stagecoaches that rumbled westward over the National Pike brought many of Ohio's early settlers. Construction began in 1953 on the Ohio Turnpike, a toll road east and west across the state.

Ohio was also a pioneer in railroad building. The first line, connecting Toledo with Adrian, Mich., was finished in 1836. Other railroads were soon built. Today most of the important lines follow the route of the Erie Canal or cross the Appalachian Mountains, then pass through Ohio's largest cities. Such cities as Cleveland, Toledo, Columbus, and Cincinnati are railway centers.

During the 1840's and the 1850's the railroads began to replace the canals as the main arteries of transportation. Lake and Ohio River traffic were not abandoned, however, and shipping by water is important even today.

Cincinnati is still a main port on the Ohio River (*see* Ohio River). Ohio also has 15 thriving ports on Lake Erie. In tons of cargo handled, Toledo, Cleveland, Ashtabula, Conneaut, Sandusky, and Lorain rank high. Lake Erie is important in moving such bulky commodities as coal, coke, and iron ore. Iron ore carried by lake boats is transferred to trains that had hauled in coal and other heavy cargoes.

In 1954 Congress permitted the United States to participate with Canada in the St. Lawrence Seaway Project. This improved waterway should make seaports of Toledo, Cleveland, and other lake ports.

An Inland Empire

A state which has ready access to coal, iron, and to the main routes of land and water transportation possesses the resources needed for industrial greatness. Ohio, with all three, can claim to be, as its motto declares, an *Imperium in Imperio* (empire within an empire).

The state has a wealth of minerals, including coal, natural gas, limestone, sand and gravel, and salt. Ohio ranks first among the states in the manufacture of clay products such as brick and tile. It also makes a large proportion of the nation's grindstones. These are cut from the variety of Ohio sandstone called Berea grit. From the state's limestone, cement is produced. High-grade iron ores are brought from the Lake Superior district to the Lake Erie ports. There these ores are made into pig iron or are shipped to blast furnaces in or near Columbus, Youngstown, Steubenville, and Pittsburgh, Pa.

For years Cleveland was the chief transshipping port for iron ore. Since the traffic has become too large for Cleveland's busy harbor, the ports of Lorain, Fairport Harbor, Conneaut, and Ashtabula have developed to help meet the need. A good share of the traffic is also carried by the great docks of Toledo, Huron, and Sandusky, farther to the west. There ore cargoes are exchanged for coal. At these ports and elsewhere in the state, blast furnaces and steel mills depend for fuel mainly upon bituminous coal and natural gas from the Ohio, Pennsylvania, West Virginia, and Kentucky fields.

At one time Ohio supplied 39 per cent of the nation's petroleum. Since then its petroleum flow has

Continued on page 361

Ohio Fact Summary

OHIO (no abbr.): Probably named from Wyandot (Iroquois) Indian words meaning "river beautiful to look upon," or "fair and beautiful river." Nickname: "Buckeye State," because of buckeye trees. Indians called the tree *Hetuck*, "eye of the buck," because of likeness to eye of deer.

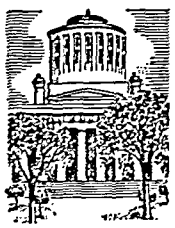
Seal: Circular shield with sheaf of wheat, right foreground; bundle of 17 arrows, left foreground; rising sun over mountain range, background.

Motto (unofficial): Imperium in Imperio (Empire within an Empire).

Flag: For description and illustration, *see* Flags.

Flower: Scarlet carnation. Bird: Cardinal. Tree (unofficial): Buckeye. Song (unofficial): 'Beautiful Ohio'—words, Ballard Macdonald; music, Mary Earl; one of seven popular Ohio songs.

THE GOVERNMENT



Capital: Columbus (since 1812).

Representation in Congress: Senate, 2; House of Representatives, 23. Electoral votes, 25.

General Assembly: Senators, 33-38; terms, 2 years. Representatives, 135-39; terms, 2 years. Convenes first Monday in January in odd numbered years. No limit to regular or special sessions.

Constitution: Adopted 1851. Proposed amendment may be (a) passed by 3/5 vote of legislature or by initiative action of the people, and (b) ratified by majority voting on amendment at a popular election.

Governor: Term, 2 years. May succeed himself.

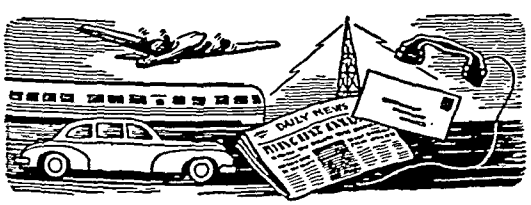
Other Executive Officers: Lieutenant governor, secretary of state, auditor, treasurer, attorney general, all elected; terms, 2 years, except auditor—term, 4 years.

Judiciary: Supreme court—7 justices, elected at large; term, 6 years. Courts of appeal—27; judges elected; term, 6 years. Common pleas courts—1 in each county, some with more than one judge; judges elected; term, 6 years. Probate courts—one in each county; judges elected; term, 6 years.

County: 88 counties, each governed by a board of three elected commissioners; term, 4 years.

Municipal: Mayor and six council members most common.

Voting Qualifications: Age, 21; residence in state, 1 year; in county, 40 days; in precinct, 40 days.



TRANSPORTATION AND COMMUNICATION

Transportation: Railroads, 8,400 miles. First railroad (Toledo to Adrian, Mich.), 1836. Rural roads, 86,300 miles. Airports, 232.

Communication: Periodicals, 279. Newspapers, 485. First newspaper, *Centinel of the North-Western Territory*, Cincinnati, 1793. Radio stations (AM and FM), 111; first station, WLW, Cincinnati, licensed March 3, 1921. Television stations, 22; first station, WEWS, Cleveland, began operation Dec. 17, 1947. Telephones, 3,018,000. Post offices, 1,320.

THE PEOPLE AND THEIR LAND

Population (1950 census): 7,946,627 (rank among 48 states—5th); urban, 70.2%; rural, 29.8%. Density: 193.8 persons per square mile (rank—8th state).

Extent: Area, 41,222 square miles, including 222 square miles of water surface (34th state in size; 33d if Great Lakes area of 3,457 square miles is added).

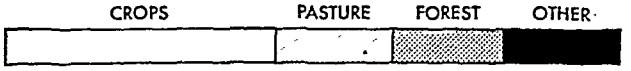
Elevation: Highest, at Campbell Hill, 1,550 feet, near Bellefontaine; lowest, Ohio River at southwest corner of state, 433 feet.

Temperature (°F.): Average—annual, 51°; winter, 30°; spring, 50°; summer, 72°; fall, 54°. Lowest recorded, −39° (Milligan, Perry County, Feb. 10, 1899); highest recorded, 113° (near Gallipolis, July 21, 1934, and other locations and earlier dates).

Precipitation: Average (inches)—annual, 38; winter, 8; spring, 11; summer, 11; fall, 8. Varies from about 32 in the north to 42 in the southeast and southwest.

Natural Features: Hilly surface in southeast a part of Appalachian Plateau untouched by glaciers; rolling plains in western half (part of Central Plains region); much of northwest part practically level (Lake Plains region). Principal rivers: Little Miami, Maumee, Miami, Muskingum, Ohio, Scioto.

Land Use: Cropland, 44%; nonforested pasture, 19%; forest, 18%; other (roads, parks, game refuges, wasteland, cities, etc.), 19%.



Natural Resources: *Agricultural*—fertile soil suited to farming, fruit growing. *Industrial*—coal, stone, cement, lime, sand and gravel, natural gas, petroleum, clays, salt, natural-gas liquids. *Commercial*—sites for Lake Erie ports and trade and industrial centers in Lake Plains region; Ohio River waterway.

OCCUPATIONS AND PRODUCTS

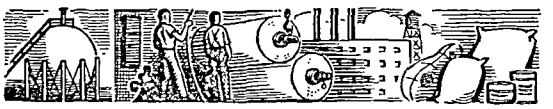
What the People Do to Earn a Living



Major Industries and Occupations, 1950

Fields of Employment	Number Employed	Percentage of Total Employed
Manufacturing	1,121,006	36.7
Wholesale and retail trade	558,092	18.2
Transportation, communication, and other public utilities	239,979	7.8
Professional services (medical, legal, educational, etc.)	236,686	7.7
Agriculture, forestry, and fishery	213,386	7.0
Construction	158,767	5.2
Personal services (hotel, domestic, laundering, etc.)	151,351	4.9
Government	122,254	4.0
Finance, insurance, and real estate	85,710	2.8
Business and repair services	72,640	2.4
Mining	30,628	1.0
Amusement, recreation, and related services	27,667	0.9
Workers not accounted for	41,439	1.4
Total employed	3,059,605	100.0

Ohio Fact Summary



What the People Produce

A. Manufactured Goods (Rank among states—2d)
Value added by manufacture* (1952), $10,033,105,000

Leading Industries in 1947 (with Principal Products)	Value Added by Manufacture	Rank among States
MACHINERY (EXCEPT ELECTRICAL). Metalworking, service, household, and general industrial machines	$1,251,011,000	1
PRIMARY METAL INDUSTRIES. Blast furnace, steel mill, and iron and steel foundry products	852,772,000	2
FABRICATED METAL PRODUCTS. Structural metal products; metal stamping and coating	634,746,000	1
TRANSPORTATION EQUIPMENT. Motor vehicles and equipment	483,421,000	3
ELECTRICAL MACHINERY. Electrical industrial apparatus	471,593,000	3
FOOD AND KINDRED PRODUCTS. Bakery products; malt liquors	413,216,000	5

*For explanation of value added by manufacture, *see* Census.



B. Farm Products (Rank among states—10th)
Total cash income (1952), $1,097,402,000

Products	Amount Produced (10-Year Average)	Rank within State*	Rank among States†
Corn	169,584,000 bu.	1	6
Hogs	1,126,968,000 lbs.	2	6
Milk	2,366,000,000 qts.	3	9
Cattle	485,269,000 lbs.	4	12
Wheat	46,592,000 bu.	5	8
Eggs	211,000,000 doz.	6	7
Hay	3,722,000 tons	7	10
Soybeans	18,552,000 bu.	8	4

*Rank in dollar value †Rank in units produced



C. Fish (Rank among states—15th)
(Lake Erie, 1950), catch, 20,225,000 lbs.; value, $3,793,000

D. Minerals (Fuels, Metals, and Stone)
Annual value (1951), $302,613,000
Rank among states—11th

Minerals (1951)	Amount Produced	Value
Coal	37,949,000 tons	$146,678,000
Stone	25,190,000 tons	36,436,000
Cement	11,872,000 bbls.	29,499,000
Lime	2,289,000 tons	29,046,000
Sand and gravel	19,431,000 tons	21,395,000
Clays	5,147,000 tons	13,224,000

E. Trade

Trade (1948)	Sales	Rank among States
Wholesale	$9,552,905,000	5
Retail	7,373,173,000	5
Service	658,244,000	5

EDUCATION



Public Schools: Elementary, 2,929; secondary, 1,143. Compulsory school age, 6 through 17. Governor appoints supt. of public instruction for 4-year term. County boards consist of 5 members elected for 4-year terms; appoint county supts. with 5-year terms as maximum. City school board members elected for 4-year terms; appoint city supts. with 5-year terms as maximum.

Private and Parochial Schools: 759.

Colleges and Universities (accredited): Colleges, 48; junior college, 1. State-supported schools include Ohio State Univ., Columbus; Ohio Univ., Athens; Bowling Green State Univ., Bowling Green; Kent State Univ., Kent; Miami Univ., Oxford; Central State College, Wilberforce.

State Schools for the Handicapped: State School for Blind, Columbus; State School for Deaf, Columbus.

Libraries: City and town public libraries, 271. Independent county library systems, 25; in 51 other counties, local libraries render rural service; 57 bookmobiles serve 42 counties. State library responsible for developing library service. Noted special libraries: Young Men's Mercantile Library Assoc., Cincinnati; Western Reserve Historical Soc., Cleveland; Martha Kinney Cooper Ohioana Library, Columbus.

Outstanding Museums: Cincinnati Art Museum, Taft Museum, Cincinnati; Museum of Art, Cleveland; Ohio State Museum, Gallery of Fine Arts, Columbus; Art Institute, Dayton; Dudley Peter Allen Memorial Art Museum, Oberlin; Museum of Art, Toledo.

CORRECTIONAL AND PENAL INSTITUTIONS

Boys' Industrial School, Lancaster; Girls' Industrial School, Delaware; Marion Training School, Marion; Ohio State Reformatory, Mansfield; Ohio Reformatory for Women, Marysville; London Prison Farm, London; Ohio Penitentiary, Columbus.

STATE PARKS AND OTHER RECREATION AREAS*†

Buckeye Lake—e. of Columbus; scenic resort area (22).
Burr Oak Reservoir—s. of Zanesville; forest; e. of (28).
Cowan—near Wilmington; lake; picnicking; east of (26).
East Harbor—on Lake Erie; 2-mile beach; picnicking (3).
Grand (or St. Marys) Lake—near Celina; water sports on Ohio's largest inland body of water (14).
Hocking—6 state park areas in state forest south of Lancaster: Ash Cave (31); Cantwell Cliffs (28); Cedar Falls (31); Conkles Hollow, cliffs and gorges (28); Old Man's Cave (31); Rock House, rock formation (28).
Independence Dam—nr. Defiance; canalway; s. w. of (1).
Indian Lake—near Russells Point; resort area (16).
John Bryan—near Yellow Springs; river gorge; stage road; Daniel Boone and Shawnee Indian country (24).
Lake Hope—west of Athens in rugged state forest; at (33).
Mohican—near Loudonville; deep river gorges in state forest; World War II memorial; southwest of (10).
Nelson and Kennedy Ledges—nr. Warren; sandstone (7).
Painesville—on Lake Erie; beach; northeast of (5).
Pike—near Waverly; rugged forested hills; at (34).
Pymatuning—along Pa. border; reservoir; n.e. of (7).
Shawnee—nr. Portsmouth; hiking; state forest; at (39).
South Bass Island—in Lake Erie; fishing; at (2).
Tar Hollow—east of Chillicothe; in state forest; at (30).

*Numbers in parentheses are keyed to map.
†There is a total of 55 state parks and other recreation areas in Ohio.

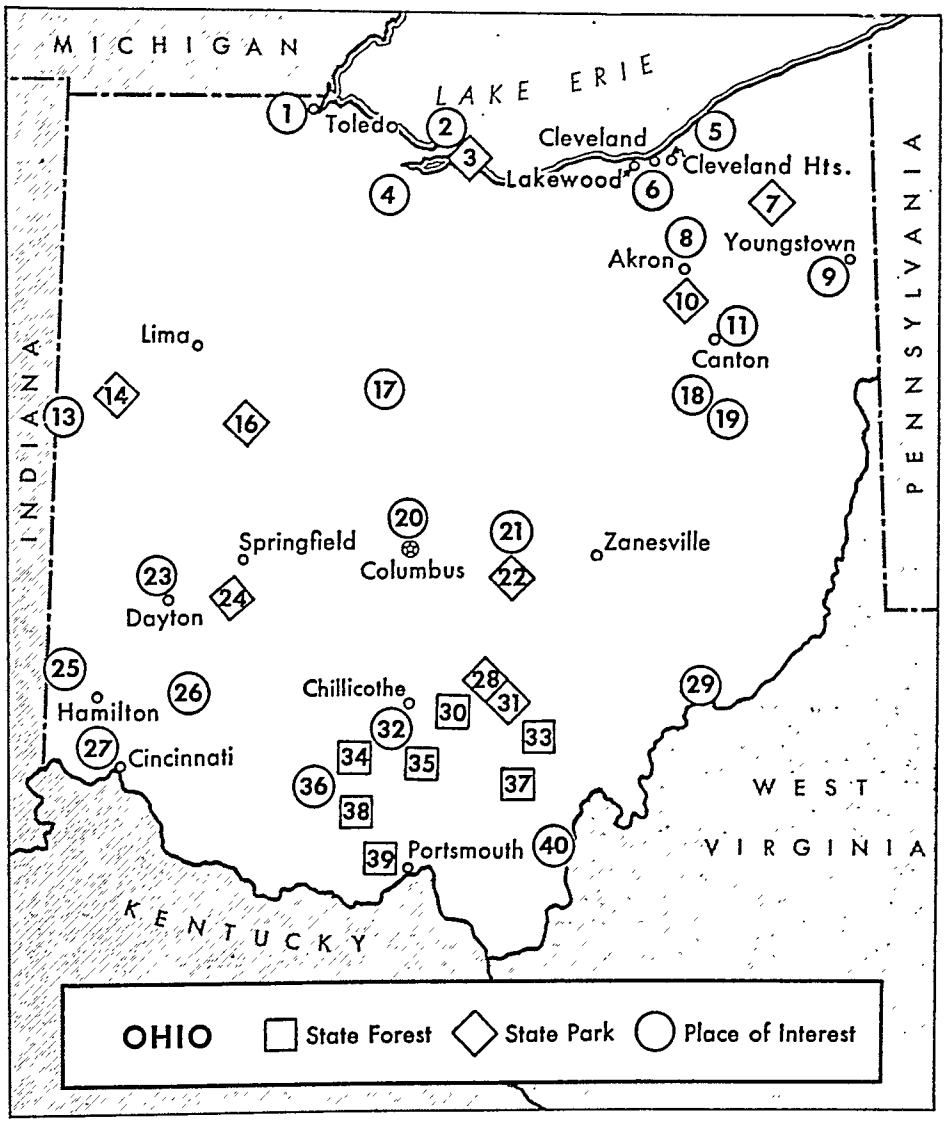
Ohio Fact Summary

STATE FORESTS*†

Brush Creek—8,979 acres (38).
Hocking—8,868 acres (30).
Pike—6,737 acres (34).
Raccoon—5,400 acres (37).
Scioto Trail — 9,329 acres (35).
Shawnee—51,676 acres (39).
Tar Hollow—16,206 a. (30).
Zaleski—17,865 acres (33).

PLACES OF INTEREST*

Akron — huge rubber factories (*see* Akron) (8).
Canton — McKinley Tomb (*see* Canton) (11).
Chillicothe—1st state capital; Mound City Group Natl. Monument nearby (32).
Cincinnati—summer opera at Zoological Gardens (*see* Cincinnati) (27).
Cleveland—Terminal Tower, Univ. Circle, Museum of Art (*see* Cleveland) (6).
Columbus—Statehouse; Ohio State Univ. campus (*see* Columbus) (20).
Dayton—Wright Field, Army plane testing center (*see* Dayton) (23).
Fort Ancient — prehistoric earthwork near Lebanon; burial mounds (26).
Fort Recovery—replica of Anthony Wayne's fort built in 1790's; museum (13).
Harding Memorial—Marion; impressive Greek colonnade encircles tombs of President and Mrs. Harding (17).
Hayes Memorial—Fremont; museum with President Hayes' library, letters, manuscripts (4).
Kirtland Temple—near Mentor; built by Mormons in community founded by Joseph Smith, 1831 (5).
Marietta—first permanent settlement in Northwest Territory (1788); Campus Martius Museum (29).
Mound Builders Memorial—near Newark; includes great earthwork and eagle-shaped effigy mound (21).
Mound City Group National Monument—prehistoric Indian mounds; near Chillicothe (32).
"Our House"—in Gallipolis; celebrated inn where Lafayette once stayed; now a museum (40).
Oxford—McGuffey Memorial Museum, where educator compiled several of his readers; Miami Univ. (25).
Perry's Victory Memorial Natl. Monument—to century of peace between U. S. and Canada; nr. Put-in-Bay (2).
Schoenbrunn Village—New Philadelphia; restored Moravian missionary settlement of 1772 (19).
Serpent Mound—near Sinking Springs; remarkable effigy mound in shape of snake with egg in its mouth (36).
Toledo—fine zoo; Univ. of Toledo (*see* Toledo) (1).
Youngstown—Mill Creek Park (*see* Youngstown) (9).
Zoar Village—remains of communal experiment (18).



LARGEST CITIES (1950 census)

Cleveland (914,808): Great Lakes port; railroad transportation center; produces iron, steel, and allied products; motor trucks and vehicle parts; textiles.
Cincinnati (503,998): Ohio River port; railway center; manufactures soap, machine tools, food products, metal products, and playing cards; printing.
Columbus (375,901): state capital and manufacturing center; makes aircraft, iron and steel products, machinery, meat-packing products, glass and paper.
Toledo (303,616): coal and iron-ore port on Lake Erie; automotive vehicles and equipment; glass products.
Akron (274,605): rubber capital of U.S.; rubber research; manufactures aircraft, tires, and other rubber products.
Dayton (243,872): manufacturing city making cash registers, refrigerators; aircraft testing at Wright Field.
Youngstown (168,330): large steel-producing center; also makes rubber goods, electrical equipment, furniture.
Canton (116,912): industrial center; steel and steel products; roller bearings; vacuum cleaners; engines.
Springfield (78,508): printing and publishing; motor trucks, diesel and gas engines, electrical equipment.
Lakewood (68,071): residential suburb west of Cleveland.
Cleveland Heights (59,141): eastern suburb of Cleveland.
Hamilton (57,951): auto bodies; machinery; paper; safes.
Lorain (51,202): steel pipe; power shovels; ships; stoves.

* Numbers in parentheses are keyed to map.
† There are 20 state forests in Ohio; the 8 largest are given here. Some of these areas include state parks.

Ohio Fact Summary

THE PEOPLE BUILD THEIR STATE



1669—René Robert Cavelier, Sieur de La Salle, explores area between Lake Erie and Ohio River.
1683—British ally with Iroquois in Ohio area against French.
1745—British build Fort Sandoski on Sandusky Bay.
1748—Virginians organize Ohio Land Company. Send Christopher Gist to explore, 1750.
1749—Céleron de Bienville claims Ohio area for France.
1761—Christian Post builds first permanent dwelling in Ohio near site of Bolivar.
1763—By Treaty of Paris, France cedes to Great Britain all claims to Ohio country. Settlers unite to defeat Indian revolt led by Ottawa chief Pontiac.
1772—David Zeisheiger founds Moravian community at Schoenbrunn, August 24; opens first school west of Allegheny Mountains at Schoenbrunn, 1773.
1785—Ft. Harmar established at mouth of Muskingum R.
1787—Ordinance of 1787 sets up basic government of Northwest Territory, which includes Ohio.
1788—Rufus Putnam and party found Marietta, April 7; first permanent white settlement in Ohio.
1794—Gen. "Mad Anthony" Wayne defeats British-Indian confederation at Fallen Timbers, August 20.
1799—Population growth permits establishment of local autonomous government in part of Northwest Territory now state of Ohio; capital, Cincinnati.
1800—Connecticut cedes the Western Reserve in territory of Ohio to federal government.
1801—John Chapman (Johnny Appleseed) plants orchards near Etna on banks of Licking Creek.
1803—Ohio becomes 17th state, March 1; first capital, Chillicothe; first governor, Edward Tiffin.
1804—First smelting furnace in Ohio established near site of Youngstown. Ohio University chartered at Athens; opened, June 1, 1809.
1810—State capital moved to Zanesville; returned to Chillicothe, 1812, when site of Columbus picked for permanent capital, February 14.
1811—*Orleans* is first steamboat on Ohio River.
1813—Oliver H. Perry leads U. S. Navy in defeat of British at Put-in-Bay on Lake Erie, September 10.
1816—Ohio legislature holds first meeting at Columbus.
1818—*Walk-in-the-Water*, first steamboat on Lake Erie, stops at Cleveland and Sandusky.
1827—National Pike (Cumberland Road) reaches Zanesville; extended to Columbus, 1833. Ohio and Erie Canal opens.
1833—Oberlin College is first U. S. college to admit Negroes on equal basis with white students; becomes first coeducational college in world, 1837.
1836—"Toledo War" ends five-year boundary dispute between Ohio and Michigan.
1837—First abolitionist (antislavery) convention in U. S. held at Mount Pleasant.
1841—Locks built to make Muskingum River navigable.
1851—Present state constitution adopted.
1852—State passes one of first laws in U. S. to regulate working hours of women and children.
1862—Kirby Smith leads Confederate force besieging Cincinnati; Clement Vallandigham, Copperhead leader, banished from Ohio.
1863—Gen. John Morgan leads Confederate raiders into Ohio; finally captured at Salineville.
1869—Ulysses S. Grant, born 1822 at Point Pleasant, becomes first Ohio-born president (18th) of U. S. Later, others were: Rutherford B. Hayes (1877); James A. Garfield (1881); Benjamin Harrison (1889); William McKinley (1897); William Howard Taft (1909); and Warren G. Harding (1921).
1870—Benjamin F. Goodrich begins manufacture of rubber articles at Akron. John D. Rockefeller organizes Standard Oil Company at Cleveland. Ohio Agricultural and Mechanical College (now Ohio State University) founded at Columbus.
1884—Pioneer electric street railway in U. S. runs in Cleveland. First cash registers made at Dayton.
1886—Oil discovered near Bowling Green. Charles Hall, born 1863 at Thompson, perfects process for refining aluminum.
1903—Wright brothers of Dayton make first flight, Kitty Hawk, N. C.; continue experiments at Dayton.
1912—Initiative and referendum adopted.
1919—Sherwood Anderson, born 1876 at Camden, publishes 'Winesburg, Ohio'.
1929—Port Columbus, at Columbus, completed, July 8.
1936—Great Lakes Exposition opens at Cleveland.
1937—Worst Ohio River flood causes great damage.
1952—Atomic Energy Commission adopts site north of Portsmouth for major atomic plant.
1953—Congress corrects technical omission by admitting Ohio to the Union as of March 1, 1803. Tornadoes cause deaths in state. Construction begun on Ohio Turnpike, east-west toll road. Robert A. Taft, U. S. senator from Ohio and Senate leader, dies.
1954—Congress authorizes U. S. to join Canada in St. Lawrence Seaway Project; Toledo, Cleveland, and other Lake Erie cities may become seaports.

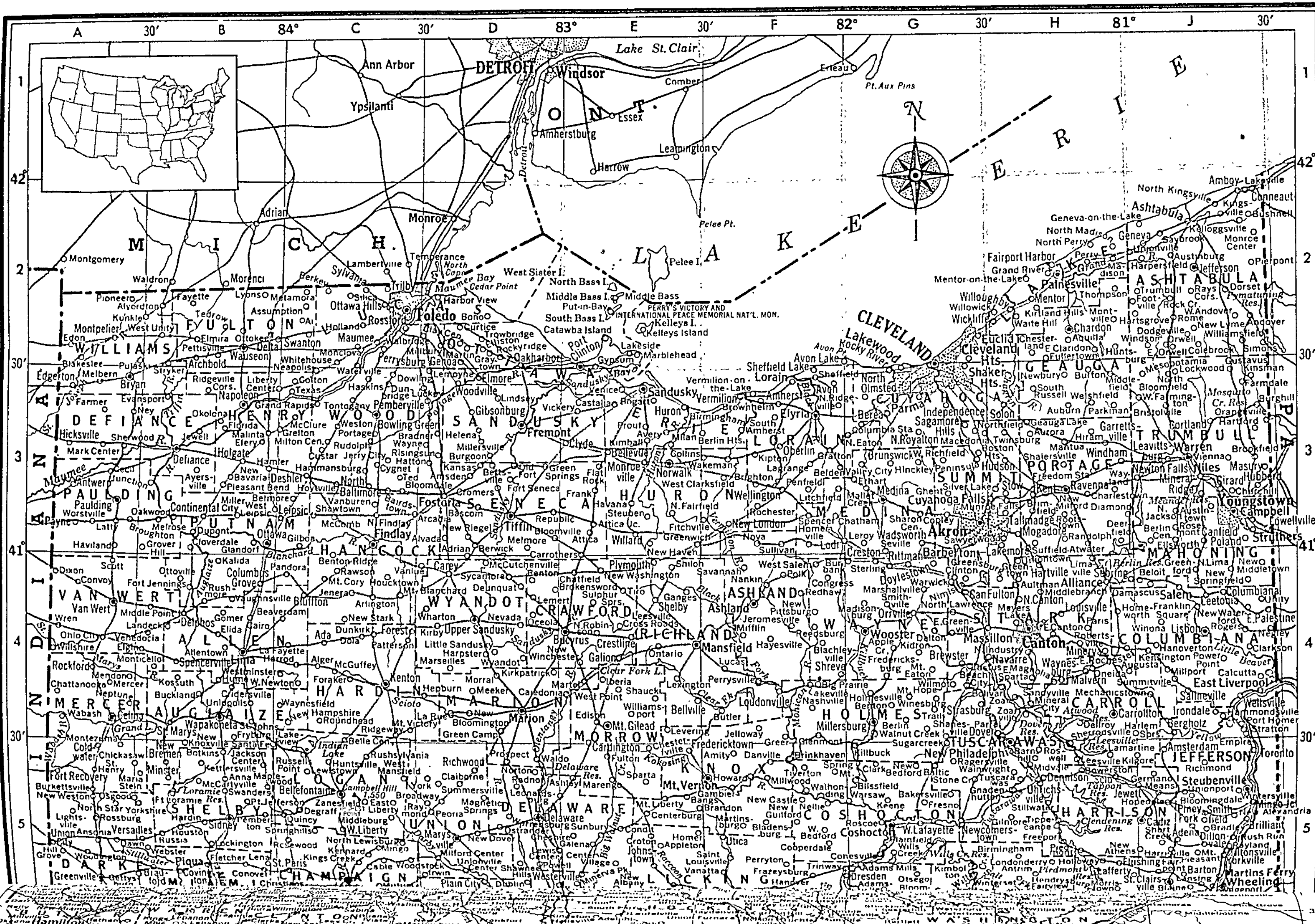
INDEX TO THE MAP OF OHIO

COUNTIES		
Adams	20,499	D 8
Allen	88,183	B 4
Ashland	33,040	F 4
Ashtabula	78,695	J 2
Athens	45,839	F 7
Auglaize	30,637	B 4
Belmont	87,740	J 5
Brown	22,221	C 8
Butler	147,203	A 7
Carroll	19,039	H 4
Champaign	26,793	C 5
Clark	111,661	C 6
Clermont	42,182	B 7
Clinton	25,572	C 7
Columbiana	98,920	J 4
Coshocton	31,141	G 5
Crawford	38,738	E 4
Cuyahoga	1,389,532	G 3
Darke	41,799	A 5
Defiance	25,925	A 3
Delaware	30,278	D 5
Erie	52,565	E 3
Fairfield	52,130	E 6
Fayette	22,554	D 6
Franklin	503,410	E 5
Fulton	25,580	B 2
Gallia	24,910	F 8
Geauga	26,646	H 3
Greene	58,892	C 6
Guernsey	38,452	H 5
Hamilton	723,952	A 7
Hancock	44,280	C 3
Hardin	28,673	C 4
Harrison	19,054	H 5
Henry	22,423	B 3
Highland	28,188	C 7
Hocking	19,520	F 6
Holmes	18,760	G 4
Huron	39,353	E 3
Jackson	27,767	E 7
Jefferson	96,495	J 5
Knox	35,287	F 5
Lake	75,979	H 2
Lawrence	49,115	E 8
Licking	70,645	F 5
Logan	31,329	C 5
Lorain	148,162	F 3
Lucas	395,551	C 2
Madison	22,300	D 6
Mahoning	257,629	J 4
Marion	49,959	D 4
Medina	40,417	G 3
Meigs	23,227	F 7
Mercer	28,311	A 4
Miami	61,309	B 5
Monroe	15,362	H 6
Montgomery	398,441	B 6
Morgan	12,836	G 6
Morrow	17,168	E 4
Muskingum	74,535	G 5
Noble	11,750	G 6
Ottawa	29,469	D 2
Paulding	15,047	A 3
Perry	28,999	F 6
Pickaway	29,352	D 6
Pike	14,607	D 7
Portage	63,954	H 3
Preble	27,081	A 6
Putnam	25,248	B 3
Richland	91,305	E 4
Ross	54,424	D 7
Sandusky	46,114	D 3
Scioto	82,910	D 8
Seneca	52,978	D 3
Shelby	28,488	B 5
Stark	283,194	H 4
Summit	410,032	G 3
Trumbull	158,915	J 3
Tuscarawas	70,320	H 5
Union	20,687	D 5
Van Wert	26,971	A 4
Vinton	10,759	E 7
Warren	38,505	B 7
Washington	44,407	H 7
Wayne	58,716	G 4
Williams	26,202	A 2
Wood	59,605	C 3
Wyandot	19,785	D 4

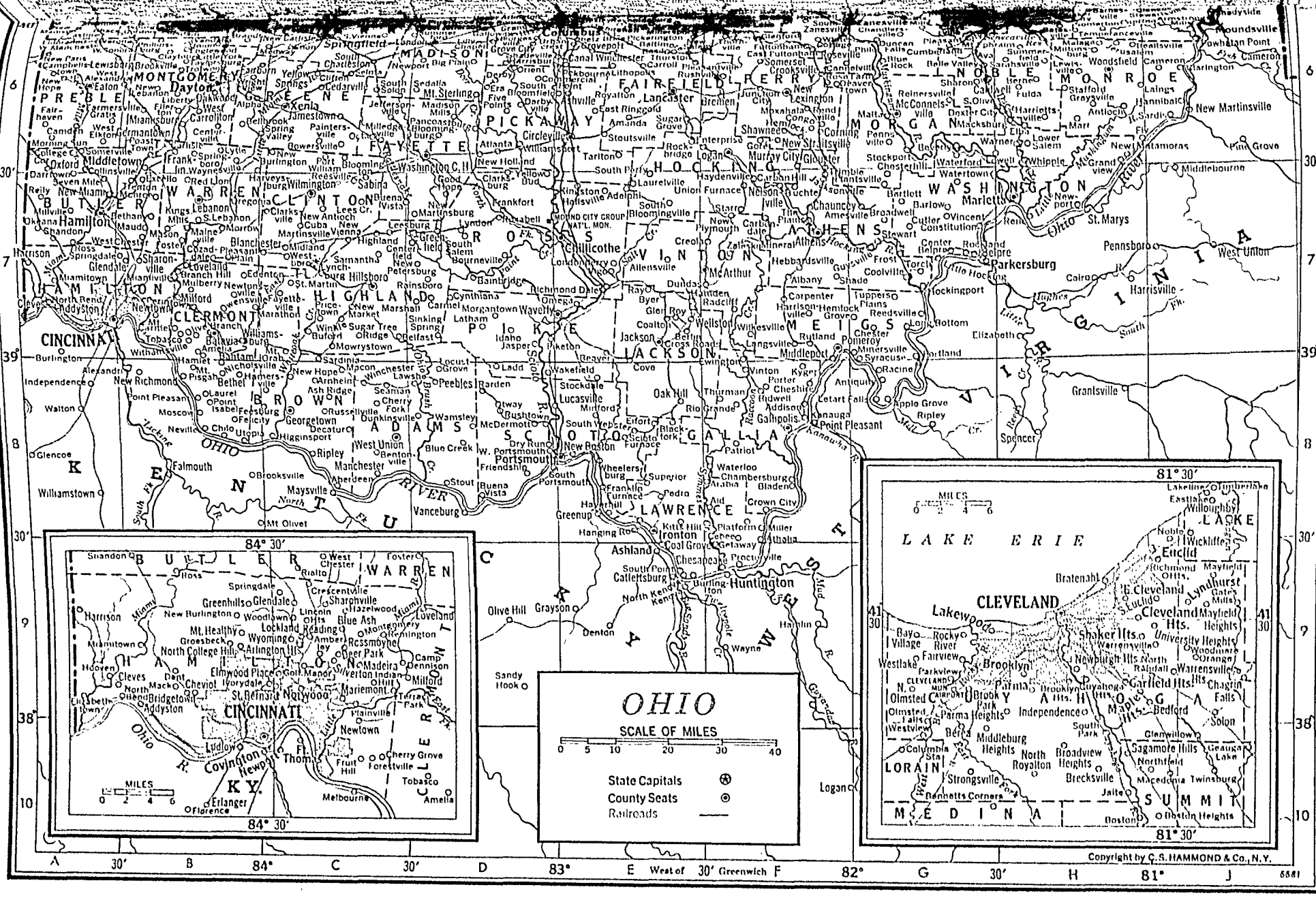
OHIO

CITIES AND TOWNS		
Aberdeen	551	C 8
Ada	3,640	C 4
Adams Mills	140	G 5
Adamsville	164	G 5
Addison	120	F 8
Addyston	1,651	B 9
Adelphi	392	E 7
Adena	1,517	J 5
Adrian	65	D 3
Ai	50	C 2
Aid	96	F 8
Akron	274,605	G 3
Albany	525	F 7
Alcony	106	B 5
Alexandria	464	E 5
Alger	943	C 4
Allensville	105	E 7
Allentown	150	B 4
Alliance	26,161	H 4
Alpha	300	B 6
Alvada	89	D 3
Alvordton	335	A 2
Amanda	587	E 6
Amberley	885	C 9
Amboy	300	J 2
Amelia	601	D 10
Amesville	269	F 7
Amherst	3,542	F 3
Amity	100	F 5
Amsden	151	D 3
Amsterdam	1,048	J 5
Andover	1,102	J 2
Anna	554	B 5
Ansonia	877	A 5
Antioch	112	H 6
Antiquity	100	G 8
Antrim	85	H 5
Antwerp	1,162	A 3
Apple Creek	548	G 4
Apple Grove	125	G 8
Appleton	75	E 5
Aquilla	386	H 2
Arabia	75	F 8
Arcadia	529	D 3
Arcanum	1,530	A 6
Archbold	1,486	B 2
Arlington	825	C 4
Arlington Heights	1,312	C 9
Armstrongs Mills	135	J 6
Ash Ridge	64	C 8
Ashland	14,287	F 4
Ashley	798	E 5
Ashtabula	23,696	J 2
Ashville	1,303	E 6
Assumption	75	B 2
Athalia	307	F 8
Athens	11,660	F 7
Atlanta	180	D 6
Attica	858	E 3
Attica Jct.	100	E 3
Atwater	750	H 3
Auburn	100	H 3
Augusta	300	J 4
Aultman	200	H 4
Aurora	571	H 3
Austinburg	1,375	J 2
Austintown	350	J 3
Ava	300	G 6
Avery	50	E 3
Avon	2,773	F 3
Avon Lake	4,342	F 2
Ayersville	105	B 3
Bainbridge	964	D 7
Bairdstown	188	C 3
Bakersville	119	G 5
Baltic	493	G 5
Baltimore	1,843	E 6
Bangs	125	F 5
Bantam	100	B 7
Barberton	27,820	G 4
Barlow	152	G 7
Barnesville	4,665	H 6
Barnhill	392	H 5
Bartlett	183	G 7
Barton	1,300	J 5
Bascom	400	D 3
Batavia	1,445	B 7
Batesville	149	H 6
Bay Village	6,917	G 9
Beach City	940	G 4
Beachwood	1,073	*G 3
Beallsville	410	J 6
Beaver	285	E 7
Beaverdam	450	C 4
Bedford	9,105	J 9
Belfast	100	D 7
Bellaire	12,573	J 5
Bellbrook	425	C 6
Belle Center	889	C 4
Belle Valley	458	G 6
Bellefontaine	10,232	C 5
Bellevue	6,906	E 3
Bellville	1,355	E 4
Belmont	638	J 5
Belmore	216	B 3
Beloit	778	J 4
Belpre	2,451	G 7
Bennetts Corners	500	G 10
Bentleyville	152	*H 3
Benton	150	G 4
Benton	150	D 4
Benton Ridge	337	C 4
Bentonville	175	C 8
Berea	12,051	G 10
Bergholz	1,035	J 4
Berkey	239	C 2
Berlin	310	G 4
Berlin Center	193	J 3
Berlin Cross Roads	100	E 7
Berlin Heights	613	F 3
Berne	40	H 6
Berwick	100	D 3
Bethany	160	B 7
Bethel	1,932	B 8
Bethesda	1,158	H 5
Bettsville	687	D 3
Beverly	723	G 6
Bexley	12,378	E 6
Bidwell	340	F 8
Big Plain	146	D 6
Big Prairie	250	G 4
Birmingham	300	F 3
Birmingham	55	H 5
Blachleyville	85	F 4
Blackfork	420	E 8
Blacklick	325	E 6
Bladen	200	F 8
Bladensburg	230	F 5
Blaine	400	J 5
Blakeslee	142	A 2
Blanchester	2,109	B 7
Blissfield	102	G 5
Bloomdale	592	D 3
Bloomfield	70	G 5
Bloomfield (Bloomingdale)	324	J 5
Bloomingburg	623	D 6
Bloomingdale	324	J 5
Bloomington	88	C 6
Bloomville	759	D 3
Blue Ash	1,420	C 9
Blue Creek	100	D 8
Blue Rock	70	G 6
Bluffton	2,423	C 4
Bolivar	776	G 4
Boston	350	H 10
Boston Heights	646	H 3
Botkins	608	B 5
Bourneville	195	D 7
Bowerston	522	H 5
Bowersville	362	C 6
Bowling Green	12,005	C 3
Bradford	2,055	B 5
Bradley	300	J 5
Bradner	924	C 3
Brady Lake	444	*H 3
Branch Hill	500	B 7
Brandt	200	B 6
Bratenahl	1,240	H 9
Brecksville	2,664	H 10
Bremen	1,187	F 6
Brewster	1,618	G 4
Brice	182	E 6
Bridgeport	4,309	J 5
Bridgetown	1,500	B 9
Brighton	107	F 3
Brilliant	2,066	J 5
Brimfield	500	H 3
Brinkhaven	150	F 5
Bristolville	250	J 3
Broadview Heights	2,279	H 10
Broadway	210	C 5
Broadwell	90	G 7
Brokensword	100	E 4
Brook Park	2,606	G 9
Brookfield	1,000	J 3
Brooklyn	6,317	H 9
Brooklyn Hts.	931	H 9
Brookside	845	J 5
Brookville	1,908	B 6
Broughton	128	B 3
Brownhelm	107	F 3
Bryan	6,365	A 3
Buchtel	569	F 7
Buckeye L.	1,401	F 6
Buckland	274	B 4
Bucyrus	10,327	E 4
Buena Vista	89	C 7
Buena Vista	200	D 8
Buffalo	700	G 6
Buford	250	C 7
Burbank	393	F 4
Burghill	150	J 3
Burgoon	223	D 3
Burkettsville	211	A 5
Burlington	325	F 9
Burton	932	H 3
Bushnell	100	J 2
Butler	833	F 4
Butlerville	152	*B 7
Byer	250	E 7
Byesville	2,236	G 6
Cable	125	C 5
Cadiz	3,020	J 5
Cairo	505	B 4
Calcutta	200	J 4
Caldwell	1,767	G 6
Caledonia	655	D 4
Cambridge	14,739	G 5
Camden	1,084	A 6
Cameron	124	J 6
Camp Dennison	350	D 9
Campbell	12,882	J 3
Campbellstown	98	A 6
Canal Fulton	1,258	H 4
Canal Winchester	1,194	E 6
Canfield	1,465	J 3
Cannelville	250	G 6
Canton	116,912	H 4
Carbon Hill	400	F 7
Carbondale	400	F 7
Cardington	1,465	E 5
Carey	3,260	D 4
Carlisle	325	B 6
Carroll	416	E 6
Carrollton	2,658	J 4
Carrothers	110	D 3
Casstown	368	B 5
Castalia	736	E 3
Castine	146	A 6
Catawba	313	C 6
Catawba Isl.	200	E 2
Cecil	266	A 3
Cedarville	1,292	C 6
Celina	5,703	A 4
Center Belpre	150	G 7
Center Village	120	E 5
Centerburg	887	E 5
Centerfield	69	C 7
Centerville	827	B 6
Centerville (Thurman)	142	F 8
Chagrin Falls	3,085	J 9
Chambersburg	225	F 8
Chandlersville	140	G 6
Chardon	2,478	H 2
Charlestown	50	H 3
Chatfield	204	E 4
Chatham	250	G 3
Chattanooga	150	A 4
Chauncey	1,016	F 7
Cherry Fork	197	C 8
Cherry Grove	250	C 10
Chesapeake	1,285	E 9
Cheshire	300	F 8
Cheshire	99	E 5
Chester	184	G 7
Chesterhill	426	G 6
Chesterland	300	H 2
Chesterville	208	E 5
Cheviot	9,944	B 9
Chickasaw	166	A 5
Chillicothe	20,133	E 7
Chilo	250	B 8
Christiansburg	666	C 5
Churchill	100	J 3
Cincinnati	503,998	B 9
Circleville	8,723	D 6
Claiborne	112	D 5
Clarington	478	J 6
Clark	250	G 5
Clarksburg	391	D 7
Clarkson	68	J 4
Clarksville	510	C 7
Clay Center	590	D 2
Claysville	55	G 6
Clayton	466	B 6
Cleveland	914,808	H 9
Cleveland Heights	59,141	J 9
Cleves	1,981	B 9
Clifton	220	C 6
Clinton	397	G 4
Cloverdale	200	B 3
Clyde	4,083	E 3
Coal Grove	2,492	E 9
Coalton	628	E 7
Coldwater	2,217	A 5
Colebrook	70	J 2
College Corner	468	A 6
Collins	250	E 3
Collinsville	176	A 6
Colton	135	C 3
Columbia Sta.	58	G 10
Columbiana	3,369	J 4
COLUMBUS	375,901	E 6
Columbus Grove	1,936	B 4
Commercial Point	238	E 6
Condit	200	E 5
Conesville	466	G 5
Congo	300	F 6
Congress	186	F 4
Conneaut	10,230	J 2
Conover	130	B 5
Constitution	100	G 7
Continental	1,023	B 3
Convoy	910	A 4
Coolville	469	G 7
Cooperdale	50	F 5
Copley	600	G 3
Corning	1,215	F 6
Cortland	1,259	J 3
Corwin	326	*B 6
Coshocton	11,675	G 5
Covington	2,172	B 5
Cozaddale	180	B 7
Craig Beach	569	*J 3
Creola	75	E 7
Crescentville	100	C 9
Crestline	4,614	E 4
Creston	1,300	G 3
Cridersville	684	B 4
Cromers	50	D 3
Crooksville	2,960	F 6
Croton	356	E 5
Crown City	301	F 8
Cuba	150	C 7
Cumberland	537	G 6
Curtice	500	D 2
Custar	263	C 3
Cutler	100	G 7
Cuyahoga Falls	29,195	G 3
Cuyahoga Hts.	713	H 9
Cygnet	527	C 3
Cynthiana	110	D 7
Dalton	938	G 4
Damascus	700	J 4
Danville	853	F 5
Darbyville	203	D 6
Darrtown	215	A 7
Dawn	85	A 5
Dayton	243,872	B 6
Decatur	170	C 8
Deer Park	7,241	C 9
Deerfield	450	H 3
Defiance	11,265	B 3
Degraff	972	C 5
Delaware	11,804	E 5
Delisle	55	A 5
Dellroy	358	H 4
Delphos	6,220	B 4
Delta	2,120	B 2
Dennison	4,432	H 5
Dent	640	B 9
Derby	300	D 6
Deshler	1,623	C 3
Deunquat	97	D 4
Dexter City	170	G 6
Diamond	300	H 3
Dillonvale	1,407	J 5
Dixon	160	A 4
Dodgeville	100	J 2
Dola	175	C 4
Donnelsville	285	*B 6
Dorset	400	J 2
Dover	9,852	G 4
Dowling	100	C 3
Doylestown	1,358	G 4
Dresden	1,310	G 5
Dry Run	300	D 8
Dublin	289	D 5
Dunbridge	250	C 3
Duncan Falls	575	G 6
Dundas	300	E 7
Dunkinsville	75	C 8
Dunkirk	972	C 4
Dupont	225	B 3
East Canton	1,001	H 4
East Claridon	350	H 2
E. Cleveland	40,047	J 9
E. Fultonham	565	F 6
E. Greenville	450	G 4
East Liberty	425	C 5
E. Liverpool	24,217	J 4
East Orwell	168	J 2
E. Palestine	5,195	J 4
East Ringgold	120	E 6
E. Rochester	250	H 4
East Sparta	811	H 4
Eastlake	7,486	J 8
Eaton	4,242	A 6
Edenton	200	C 7
Edgerton	1,246	A 3
Edison	471	E 4
Edon	645	A 2
Eifort	134	E 8
Elba	150	H 6
Eldorado	364	A 6
Elery	50	B 3
Elgin	126	A 4
Elida	607	B 4
Elizabethtown	100	A 9
Ellerton	160	B 6
Elliston	130	D 2
Ellsworth	200	J 3
Elmira	125	B 2
Elmore	1,215	D 3
Elmwood Place	4,113	B 9
Elyria	30,307	F 3
Empire	610	J 5
Englewood	678	B 6
Enon	462	C 6
Enterprise	100	F 6
Era	80	D 6
Erhart	90	G 3
Etna	325	E 6
Euclid	41,396	J 9
Evansport	250	B 3
Ewington	64	F 8
Excello	575	B 7
Fairborn	7,847	B 6
Fairhaven	290	A 6
Fairpoint	500	J 5
Fairport Harbor	4,519	H 2
Fairview	192	H 5
Fairview	9,311	G 9
Farmdale	202	J 3
Farmer	200	A 3
Farmersville	587	A 6
Fayette	1,003	B 2
Fayetteville	401	C 7
Feesburg	150	B 8
Felicity	716	B 8
Findlay	23,845	C 3
Fitchville	157	E 3
Flat Rock	325	E 3
Fletcher	515	B 5
Florida	227	B 3
Flushing	1,158	J 5
Fly	200	H 6
Footville	75	J 2
Foraker	110	C 4
Forest	1,114	C 4
Forestville	1,500	C 10
Fort Jennings	330	B 4
Fort Loramie	508	B 5
Ft. Recovery	1,231	A 5
Fort Seneca	155	D 3
Foster	200	C 9
Fostoria	14,351	D 3
Frank	100	E 3
Frankfort	869	D 7
Franklin	5,388	B 6
Franklin Furnace	450	E 8
Franklin Sq.	110	J 4
Frazeysburg	689	F 5
Fredericksburg	517	G 4
Fredericktown	1,467	F 5
Freedom Sta.	500	H 3
Freeport	566	H 5
Fremont	16,537	D 3
Fresno	225	G 5
Friendship	500	D 8
Fruit Hill	300	C 10
Fulda	60	H 6
Fullertown	100	H 2
Fulton	269	E 5
Fultonham (Uniontown)	232	F 6
Gahanna	596	E 5
Galena	424	E 5
Galion	9,952	E 4
Gallipolis	7,871	F 8
Galloway	300	D 6
Gambier	1,037	F 5
Ganges	120	E 4
Garfield Heights	21,662	J 9
Garrettsville	1,504	H 3
Gates Mills	1,056	J 9
Geauga Lake	1,300	J 10
Geneva	4,718	J 2
Geneva-on-the-Lake	388	H 2
Genoa	1,723	D 2
Georgesville	150	D 6
Georgetown	2,200	C 8
Germano	180	J 5
Germantown	2,478	B 6
Getaway	100	F 9
Gettysburg	451	A 5
Ghent	75	G 3
Gibsonburg	2,281	D 3
Gilboa	181	C 3
Gilmore	65	H 5
Girard	10,113	J 3
Glandorf	479	B 3
Glen Roy	100	E 7
Glencoe	500	J 6
Glendale	2,402	C 9
Glenford	180	F 6
Glenmont	242	F 4
Glenwillow	257	J 10
Glouster	2,327	F 6

*No room on map for name.



LAKE ERIE
MICH.
ONT.
Lake St. Clair
DETROIT
Windsor
Ann Arbor
Ypsilanti
Monroe
Adrian
Toledo
Sandusky
CLEVELAND
Lakewood
Lorain
Elyria
Akron
Canton
Youngstown
Warren
Mansfield
Marion
Lima
Findlay
Fremont
Tiffin
Ashtabula
Painesville
Steubenville
East Liverpool
Wheeling
Coshocton
Mt. Vernon
Delaware
WILLIAMS
FULTON
LUCAS
DEFIANCE
HENRY
WOOD
SANDUSKY
OTTAWA
ERIE
LORAIN
CUYAHOGA
GEAUGA
LAKE
ASHTABULA
TRUMBULL
PORTAGE
SUMMIT
MEDINA
HURON
SENECA
HANCOCK
PUTNAM
PAULDING
VAN WERT
ALLEN
WYANDOT
CRAWFORD
RICHLAND
ASHLAND
WAYNE
STARK
MAHONING
COLUMBIANA
CARROLL
JEFFERSON
HARRISON
TUSCARAWAS
HOLMES
COSHOCTON
KNOX
MORROW
MARION
HARDIN
AUGLAIZE
MERCER
SHELBY
LOGAN
UNION
DELAWARE
LICKING
CHAMPAIGN
DARKE
INDIANA
PA.
Pelee I.
Pt. Aux Pins
PERRY'S VICTORY AND INTERNATIONAL PEACE MEMORIAL NAT'L. MON.


OHIO
SCALE OF MILES
0 5 10 20 30 40
State Capitals
County Seats
Railroads
MILES
0 2 4 6
LAKE ERIE
CLEVELAND
Lakewood
Euclid
Cleveland Hts.
Shaker Hts.
Brooklyn
Parma
Independence
Middleburg Heights
North Royalton
Broadview Heights
Brecksville
Sagamore Hills
Northfield
Macedonia
Twinsburg
Solon
Bedford
Maple Hts.
Garfield Hts.
Warrensville
Chagrin Falls
Bratenahl
Lyndhurst
Mayfield Hts.
Willoughby
Wickliffe
Eastlake
Lakeline
Painesville
Fairport Harbor
Grand River
Rocky River
Bay Village
Westlake
Olmsted Falls
Olmsted Twp.
Berea
Strongsville
Bennetts Corners
Columbia Sta.
Jaite
Boston
Peninsula
Hudson
Obetz Heights
Cuyahoga River
Chagrin River
Grand River
LORAIN
MEDINA
SUMMIT
LAKE
GEAUGA
84° 30'
81° 30'
41 30
BUTLER
WARREN
HAMILTON
CLERMONT
CINCINNATI
Hamilton
Middletown
Oxford
Fairfield
Mason
Lebanon
Monroe
Springdale
Glendale
Sharonville
Reading
Lockland
Wyoming
Amberley
Deer Park
Madeira
Indian Hill
Milford
Loveland
Blue Ash
Sycamore
Mariemont
Terrace Park
Newtown
Fruit Hill
Forestville
Cherry Grove
Tobasco
Amelia
Melbourne
Florence
Erlanger
Ludlow
Fort Thomas
Covington
Newport
Bellevue
Dayton
Xenia
Springfield
Columbus
Zanesville
Cambridge
Marietta
Parkersburg
Pomeroy
Middleport
Gallipolis
Ironton
Huntington
Portsmouth
Chillicothe
Athens
Logan
Lancaster
Newark
Cambridge
Steubenville
Wheeling
Martins Ferry
Belmont
Monroe
Noble
Morgan
Washington
Meigs
Gallia
Lawrence
Scioto
Jackson
Vinton
Hocking
Perry
Fairfield
Pickaway
Fayette
Clinton
Warren
Butler
Hamilton
Clermont
Brown
Adams
Highland
Pike
Ross
Madison
Greene
Preble
Montgomery
Harrison
Jefferson
Belmont
Guernsey
Muskingum
Coshocton
Knox
Licking
Delaware
Union
Marion
Crawford
Wyandot
Hancock
Seneca
Sandusky
Erie
Huron
Lorain
Medina
Summit
Portage
Trumbull
Mahoning
Columbiana
Carroll
Tuscarawas
Holmes
Wayne
Ashland
Richland
Morrow
Hardin
Allen
Auglaize
Mercer
Van Wert
Putnam
Henry
Williams
Fulton
Lucas
Wood
Ottawa
Sandusky
Erie
Huron
Lorain
Cuyahoga
Lake
Geauga
Ashtabula
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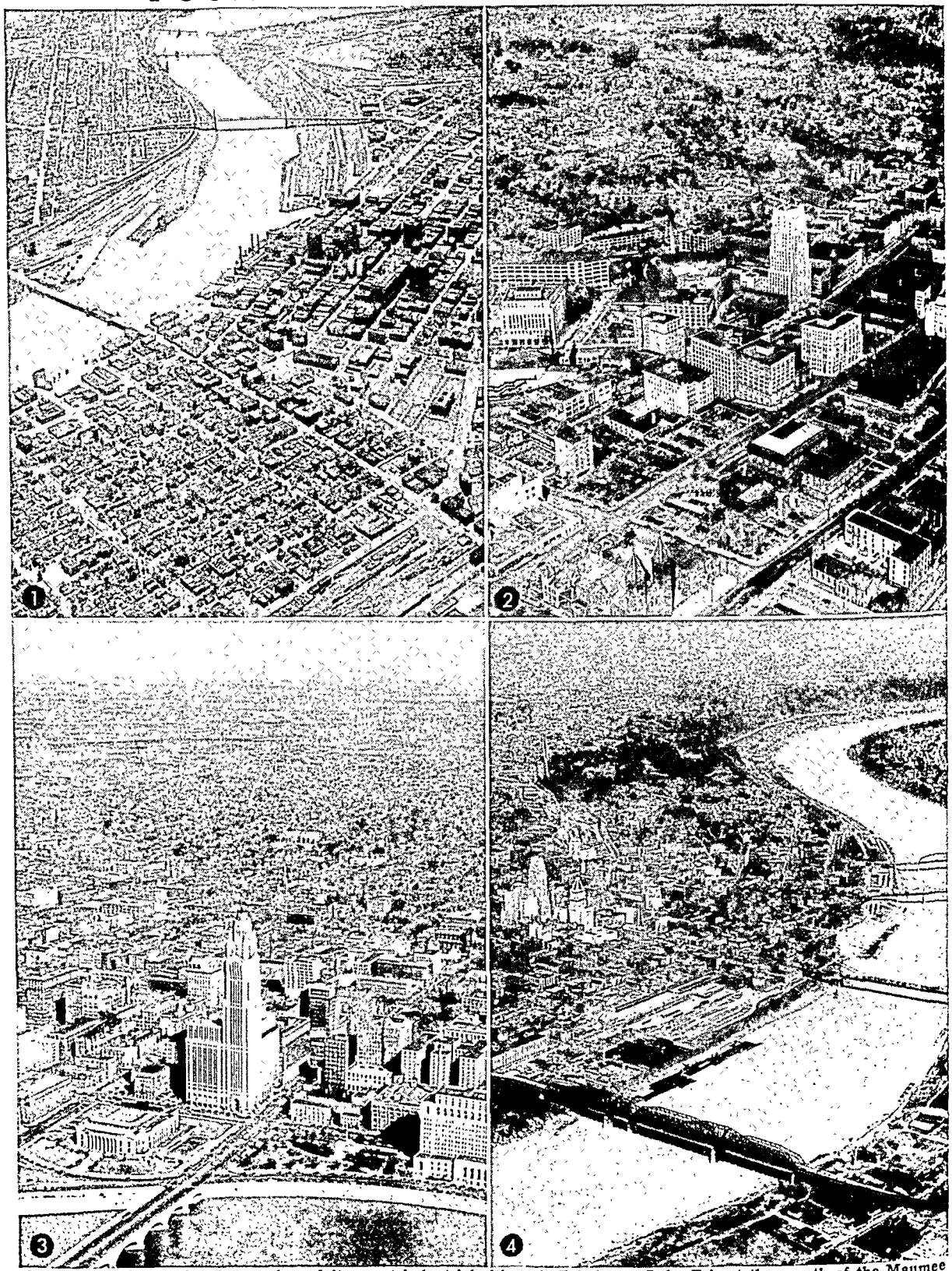
Gnadenhutten 895 G 5
Golf Manor 3,603 C 9
Gomer 300 B 4
Good Hope 300 D 7
Gordon 197 B 6
Gore 250 F 6
Grafton 1,194 F 3
Grand Rapids 657 C 3
Grand River 448 H 2
Grandview 125 H 7
Grandview Heights 7,659 D 6
Granville 2,653 E 5
Gratiot 187 F 6
Gratis 575 A 6
Graysville 138 H 6
Graytown 125 D 2
Green Camp 388 D 4
Green Sprs. 1,082 E 3
Greenfield 4,862 D 7
Greenford 245 J 4
Greenhills 3,005 B 9
Greensburg 550 G 4
Greentown 750 H 4
Greenville 8,859 A 5
Greenwich 1,204 E 3
Greer 95 F 4
Grelton 145 C 3
Groesbeck 700 B 9
Grove City 2,339 D 6
Groveport 1,165 E 6
Grover Hill 463 B 3
Gustavus 150 J 3
Guysville 250 G 7
Gypsum 650 E 2
Halls Corners 254 *J 3
Hallsville 182 E 7
Hamden 951 F 7
Hamersville 380 C 8
Hamilton 57,951 A 7
Hamler 490 B 3
Hamlet 200 B 8
Hammansburg 81 C 3
Hammondsville 475 J 4
Hanford 922 *E 6
Hanging Rock 465 E 8
Hannibal 500 J 6
Hanover 308 F 5
Hanoverton 344 J 4
Harbor View 392 D 2
Hardin 50 B 5
Harlem Sprs. 275 J 4
Harpster 236 D 4
Harriettsville 175 H 6
Harrisburg 344 D 6
Harrison 1,943 A 9
Harrisonville 100 F 7
Harrisville 420 J 5
Harrod 482 C 4
Hartford 225 J 3
Hartford (Croton) 356 E 5
Hartsgrove 575 J 2
Hartville 1,200 H 4
Harveysburg 477 C 7
Haskins 469 C 3
Hatton 72 C 3
Havana 93 E 3
Haverhill 150 E 8
Haviland 235 A 3
Haydenville 800 F 7
Hayesville 381 F 4
Hazelwood 500 C 9
Hebbardsville 75 F 7
Hebron 864 E 6
Helena 314 D 3
Hemlock 253 F 6
Hemlock Grove 75 F 7
Hendrysburg 300 H 5
Hepburn 120 D 4
Hicksville 2,629 A 3
Higginsport 385 C 8
Highland 280 C 7
Highland Hts. 762 *H 2
Hill Grove 85 A 5
Hilliards 610 D 5
Hillsboro 5,126 C 7
Hinckley 1,796 G 3
Hiram 986 H 3
Hockingport 100 G 7
Holgate 1,092 B 3
Holland 714 C 2
Hollansburg 295 A 5
Holloway 654 H 5
Holmesville 392 G 4
Homerville 110 F 3
Homeworth 600 J 4
Hooven 550 A 9
Hopedale 888 J 5
Hopewell 225 F 6
Houcktown 110 C 4
Houston 150 B 5
Howard 350 F 5
Hoytville 340 C 3
Hubbard 4,560 J 3
Hudson 1,538 H 3
Hume 92 B 4
Hunting Valley 477 *H 3
Huntsburg 112 H 2
Huntsville 408 C 5
Huron 2,515 E 3
Iberia 250 E 4
Idaho 50 D 7
Independence 3,105 H 9
Indian Hill 2,090 C 9
Irondale 775 J 4
Ironton 16,333 E 8
Irwin 182 D 5
Ithaca 146 A 6
Jackson 6,504 E 7
Jackson Center 698 B 5
Jacksontown 257 F 6
Jacksonville 657 F 7
Jaite 71 H 10
Jamestown 1,345 C 6
Jasper 150 D 7
Jefferson 1,844 J 2
Jeffersonville 865 C 6
Jelloway 100 F 4
Jenera 316 C 4
Jeromesville 513 F 4
Jerry City 360 C 3
Jersey 140 E 5
Jerusalem 175 H 6
Jewell 225 B 3
Jewett 1,019 H 5
Johnstown 1,220 E 5
Junction 75 A 3
Junction City 805 F 6
Justus 325 G 4
Kalida 533 B 4
Kanauga 275 F 8
Kansas 350 D 3
Keene 150 G 5
Kelleys Island 324 E 2
Kelloggsville 200 J 2
Kennard 75 C 5
Kensington 500 J 4
Kent 12,418 H 3
Kenton 8,475 C 4
Kettlersville 172 B 5
Kidron 150 G 4
Kilgore 116 H 5
Killbuck 767 G 5
Kimball 75 E 3
Kimbolton 228 G 5
Kings Creek 150 C 5
Kings Mills 650 B 7
Kingston 958 E 7
Kingsville 1,000 J 2
Kinsman 750 J 3
Kipton 300 F 3
Kirby 164 D 4
Kirkersville 299 E 6
Kirkpatrick 55 D 4
Kirtland Hills 235 H 2
Kitts Hill 90 E 8
Kossuth 75 B 4
Kunkle 260 A 2
Kyger 110 F 8
La Fayette 444 C 4
La Rue 793 D 4
Ladd 80 D 8
Lafferty 630 H 5
Lagrange 712 F 3
Laings 65 J 6
Lakeline 183 J 8
Lakemore 2,463 H 3
Lakeside 1,034 E 2
Lakeview 966 C 4
Lakeville 190 F 4
Lakeville 3,432 J 2
Lakewood 68,071 G 9
Lancaster 24,180 E 6
Landeck 119 B 4
Langsville 50 F 7
Lansing 2,000 J 5
Latham 100 D 7
Latty 272 A 3
Laura 380 B 6
Laurel 100 B 8
Laurelville 482 E 7
Lawrenceville 191 C 6
Lawshe 180 D 8
Leavittsburg 2,533 J 3
Lebanon 4,618 B 7
Lees Creek 150 C 7
Leesburg 841 D 7
Leesville 297 H 5
Leesville Cross Roads 214 E 4
Leetonia 2,565 J 4
Leipsic 1,706 C 3
Lemert 50 D 4
Lemoyne 155 D 3
Lena 202 B 5
Leonardsburg 63 D 5
Leroy 320 G 3
Letart Falls 400 F 8
Levering 75 E 4
Lewis Center 200 D 5
Lewisburg 1,230 A 6
Lewistown 250 C 5
Lewisville 217 H 6
Lexington 739 E 4
Liberty 175 B 6
Liberty Center 816 B 3
Lightsville 50 A 5
Lilly Chapel 250 D 6
Lima 50,246 B 4
Limaville 209 H 4
Lincoln Hts. 5,531 C 9
Lindsey 512 D 3
Linndale 399 *G 3
Lisbon 3,293 J 4
Litchfield 350 F 3
Lithopolis 350 E 6
Little Sandusky 70 D 4
Little York 150 B 6
Lockbourne 376 E 6
Lockington 245 B 5
Lockland 5,736 C 9
Lockwood 61 J 3
Locust Grove 118 D 8
Lodi 1,523 F 3
Logan 5,972 F 6
London 5,222 C 6
Londonderry 210 E 7
Long Bottom 200 G 7
Lorain 51,202 F 3
Lore City 495 H 6
Loudonville 2,523 F 4
Louisville 3,801 H 4
Loveland 2,149 D 9
Lowell 638 H 6
Lowellville 2,227 J 3
Lower Salem 126 H 6
Lucas 573 F 4
Luckey 764 D 3
Ludlow Falls 277 B 6
Lynchburg 972 C 7
Lyndhurst 7,359 J 9
Lyndon 50 D 7
Lyons 511 B 2
Lytle 200 B 6
Macedonia 600 J 10
Mack 870 B 9
Macksburg 272 G 6
Macon 75 C 8
Madeira 2,689 C 9
Madison 1,127 H 2
Madisonburg 135 G 4
Magnetic Sprs. 321 D 5
Magnolia 901 H 4
Maineville 312 B 7
Malaga 100 H 6
Malinta 308 B 3
Mallet Creek 200 G 3
Malta 968 G 6
Malvern 1,277 H 4
Manchester 2,281 C 8
Mansfield 43,564 F 4
Mantua 1,059 H 3
Maple Hts. 15,586 H 9
Maplewood 184 B 5
Marathon 263 C 7
Marble Cliff 437 *D 5
Marblehead 867 E 2
Marengo 275 E 5
Maria Stein 200 A 5
Mariemont 3,514 C 9
Marietta 16,006 G 7
Marion 33,817 D 4
Mark Center 158 A 3
Marseilles 156 D 4
Marshall 50 C 7
Marshallville 458 G 4
Martel 196 E 4
Martin 350 D 2
Martins Ferry 13,220 J 5
Martinsburg 264 F 5
Martinsville 399 C 7
Marysville 4,256 D 5
Mason 1,196 B 7
Massillon 29,594 H 4
Masury 2,151 J 3
Maud 400 B 7
Maumee 5,548 C 2
Mayfield 805 J 9
Mayfield Hts. 5,807 J 9
McArthur 1,466 F 7
McCartyville 100 B 5
McClure 508 C 3
McComb 1,026 C 3
McConnelsville 1,941 G 6
McCutchenville 347 D 4
McDermott 700 D 8
McDonald 1,858 *J 3
McGuffey 639 C 4
Means 89 J 5
Mechanicsburg 1,920 C 5
Mechanicstown 150 H 4
Medina 5,097 G 3
Medway 975 C 6
Meeker 175 D 4
Melbern 140 A 3
Melmore 225 D 3
Melrose 237 B 3
Mendon 614 A 4
Mentor 2,383 H 2
Mentor-on-the-Lake 1,413 G 2
Mercer 150 A 4
Mesopotamia 310 J 3
Metamora 532 C 2
Meyers Lake 301 H 4
Miamisburg 6,329 B 6
Miamitown 500 A 9
Miamiville 250 B 7
Middle Bass 80 E 2
Middle Point 583 B 4
Middlebranch 600 H 4
Middleburg 300 C 5
Middleburg Heights 2,299 G 10
Middlefield 1,141 H 3
Middleport 3,446 F 7
Middletown 33,695 A 6
Midland 338 C 7
Midvale 632 H 5
Midway (Sedalia) 276 D 6
Mifflin 186 F 4
Milan 846 E 3
Milford 2,448 D 9
Milford Center 753 D 5
Millbury 482 D 2
Milledgeville 208 C 6
Miller 140 F 8
Miller City 144 B 3
Millersburg 2,398 F 4
Millersport 605 E 6
Millersville 100 D 3
Millport 60 J 4
Millville 458 A 7
Millwood 200 F 5
Milton Center 201 C 3
Miltonsburg 100 H 6
Mineral 150 F 7
Mineral City 831 H 4
Mineral Ridge 1,750 J 3
Minersville 400 G 7
Minerva 3,280 H 4
Minerva Park 232 E 5
Minford 300 E 8
Mingo 130 C 5
Mingo Jct. 4,464 J 5
Minster 1,728 B 5
Mogadore 1,818 H 3
Monclova 94 C 2
Monroe 360 B 7
Monroe Center 150 J 2
Monroeville 1,275 E 3
Montezuma 299 A 4
Montgomery 579 C 9
Monticello 55 B 4
Montpelier 3,867 A 2
Montville 200 H 2
Moreland Hills 1,040 *H 3
Morgantown 75 D 7
Morning Sun 102 A 6
Morral 461 D 4
Morristown 404 H 5
Morrow 1,137 B 7
Moscow 336 B 8
Mt. Blanchard 444 D 4
Mount Carmel 300 B 7
Mount Cory 302 C 4
Mount Eaton 203 G 4
Mt. Ephraim 90 G 6
Mt. Gilead 2,351 E 4
Mt. Healthy 5,533 B 9
Mount Hope 158 G 4
Mt. Liberty 300 E 5
Mount Orab 758 C 7
Mt. Pisgah 145 B 8
Mt. Pleasant 760 J 5
Mt. Sterling 1,172 D 6
Mt. Vernon 12,185 E 5
Mt. Victory 609 D 4
Mowrystown 394 C 7
Moxahala 400 F 6
Mulberry 328 B 7
Munroe Falls 933 H 3
Murray City 752 F 6
Mutual 178 C 5
Nankin 400 F 4
Napoleon 5,335 B 3
Nashport 180 F 5
Nashville 234 F 4
Navarre 1,763 H 4
Neapolis 200 C 3
Neffs 1,024 J 5
Negley 500 J 4
Nellie 165 F 5
Nelsonville 4,845 F 7
Neptune 100 A 4
Nevada 824 D 4
Neville 127 B 8
New Albany 268 E 5
New Alexandria 383 J 5
New Antioch 121 C 7
New Athens 509 H 5
New Bavaria 132 B 3
New Bloomington 288 D 4
New Boston 4,754 E 8
New Bremen 1,546 B 5
New Burlington 352 C 6
New Burlington 600 B 9
New Carlisle 1,640 C 6
New Castle 120 F 5
New Concord 1,797 G 6
New Dover 120 D 5
New Hampshire 197 C 4
New Haven 289 E 3
New Holland 799 D 6
New Knoxville 662 B 5
New Lebanon 696 B 6
New Lexington 4,233 F 6
New London 2,023 F 3
New Lyme 200 J 2
New Madison 757 A 6
New Market 50 C 7
New Martinsburg 120 D 7
New Matamoras 781 J 6
New Miami 1,860 A 7
New Middletown 264 J 4
New Milford 325 H 3
New Moorefield 160 C 6
New Paris 1,046 A 6
New Petersburg 75 D 7
New Philadelphia 12,948 G 5
New Pittsburg 150 F 4
New Plymouth 100 F 7
New Richmond 1,960 B 8
New Riegel 317 D 3
New Rome 75 D 6
New Salem 300 E 6
New Springfield 360 J 4
New Stark 65 C 4
New Straitsville 1,122 F 6
New Vienna 807 C 7
New Washington 910 E 4
New Waterford 610 J 4
New Weston 136 A 5
New Winchester 150 D 4
Newark 34,275 F 5
Newburgh Heights 3,689 H 9
Newbury 175 H 3
Newcomerstown 4,514 G 5
Newport 500 H 7
Newport 225 C 6
Newton Falls 4,451 J 3
Newtonsville 182 B 7
Newtown 1,462 C 10
Ney 301 B 3
Nicholsville 50 B 8
Niles 16,773 J 3
N. Baltimore 2,771 C 3
North Bend 711 B 9
N. Bloomfield 700 J 3
N. Canton 4,032 H 4
North College Hill 7,921 B 9
North Eaton G 3
North Fairfield 468 E 3
North Findlay 80 C 3
N. Hampton 424 C 5
N. Industry 1,800 H 4
North Kenova 200 E 9
N. Kingsville 1,271 J 2
N. Lewisburg 854 C 5
North Lima 750 J 4
N. Madison 200 H 2
N. Olmstead 6,604 G 9
North Perry 470 H 2
North Randall 178 H 9
N. Ridgeville 1,700 F 3
N. Robinson 252 E 4
N. Royalton 3,939 H 10
North Star 166 A 5
Northfield 780 J 10
Norton 50 D 5
Norwalk 9,775 E 3
Norwich 197 G 6
Norwood 35,001 C 9
Nova 271 F 3

No room on map for name.

Oak Hill	1,615	E 8
Oakharbor	2,370	D 2
Oakwood	9,691	B 6
Oakwood	542	B 3
Oberlin	7,062	F 3
Obetz	1,049	E 6
Oceola	114	D 4
Octa	87	C 6
Ohio City	861	A 4
Okeana	158	A 7
Okolona	115	B 3
Old Fort	250	D 3
Old Washington	322	H 5
Olive Branch	100	B 7
Olmsted Falls	1,137	G 9
Omega	100	E 7
Oneida	150	H 4
Orange	897	J 9
Orangeville	367	J 3
Oregonia	150	B 7
Orient	224	D 6
Orrville	5,153	G 4
Orwell	759	J 2
Osgood	194	A 5
Ostrander	408	D 5
Otsego	117	G 5
Ottawa	2,962	B 3
Ottawa Hills	2,333	C 2
Ottokee	143	B 2
Ottoville	543	B 4
Otway	229	D 8
Owensville	419	B 7
Oxford	6,944	A 6
Painesville	14,432	H 2
Paintersville	110	C 6
Palestine	207	A 5
Pancoastburg	175	D 6
Pandora	717	C 4
Paris	250	H 4
Parkman	181	H 3
Parkview	661	G 9
Parma	28,897	H 9
Parma Hts.	3,901	G 9
Parral	199	G 4
Pataskala	928	E 6
Patriot	75	F 8
Patterson	189	C 4
Paulding	2,352	A 3
Payne	1,062	A 3
Peebles	1,498	D 8
Pemberton	225	B 5
Pemberville	1,099	C 3
Penfield	95	F 3
Peninsula	636	G 3
Pennsville	160	G 6
Peoria	193	D 5
Pepper Pike	874	*H 3
Perintown	124	B 7
Perry	665	H 2
Perrysburg	4,006	C 2
Perrysville	674	F 4
Perryton	104	F 5
Pettisville	325	B 2
Phillipsburg	609	B 6
Philo	881	G 6
Pickerington	433	E 6
Piedmont	250	H 5
Pierpont	500	J 2
Piketon	768	E 7
Piney Fork	1,660	J 5
Pioneer	696	A 2
Piqua	17,447	B 5
Pitsburg	359	A 6
Plain City	1,715	D 5
Plainfield	136	G 5
Plainville	500	C 9
Pleasant Bend	77	B 3
Pleasant City	511	G 6
Pleasant Hill	940	B 5
Pleasant Plain	164	B 7
Pleasantville	618	F 6
Plumwood	200	D 6
Plymouth	1,510	E 4
Poast Town	150	B 6
Point Isabel	76	B 8
Point Pleasant	75	B 8
Poland	1,652	J 3
Polk	332	F 4
Pomeroy	3,656	G 7
Port Clinton	5,541	E 2
Port Homer	75	J 4
Port Jefferson	409	C 5
Port Washington	514	*H 5
Port William	352	C 6
Portage	437	C 3
Porter	115	F 8
Portland	150	G 7
Portsmouth	36,798	D 8
Potsdam	241	B 6
Powell	324	D 5
Power Point	275	J 4
Powhatan Pt.	2,135	J 6
Pricetown	200	C 7
Proctorville	737	F 9
Prospect	1,031	D 5
Pulaski	200	A 2
Put-in-Bay	191	E 2
Quaker City	655	H 6
Quincy	616	C 5
Racine	536	G 8
Radcliff	175	F 7
Radnor	215	D 5
Ragersville	100	G 5
Rainsboro	225	D 7
Randolph	1,000	H 3
Rarden	251	D 8
Ravenna	9,857	H 3
Rawson	407	C 4
Ray	65	E 7
Rayland	726	J 5
Raymond	300	C 5
Rays Corners	75	J 2
Reading	7,836	C 9
Red Lion	150	B 7
Redhaw	100	F 4
Reedsburg	110	F 4
Reedsville	300	G 7
Reesville	200	C 7
Reily	160	A 7
Reinersville	80	G 6
Remington	412	C 9
Rendville	301	F 6
Reno	140	H 7
Republic	615	D 3
Reynoldsburg	724	E 6
Rialto	70	C 9
Richmond	579	J 5
Richmond (Grand River)	448	H 2
Richmond Dale	500	E 7
Richmond Hts	891	J 9
Richwood	1,866	D 5
Ridgeville Corners	320	B 3
Ridgeway	384	C 4
Rio Grande	388	F 8
Ripley	1,792	C 8
Risingsun	744	C 3
Rittman	3,810	G 4
Riverlea	324	D 5
Riverside	370	*B 6
Rix Mills	56	G 6
Robertsville	465	H 4
Robins	300	H 6
Rochester	178	F 3
Rock Creek	604	J 2
Rockbridge	300	E 6
Rockford	1,112	A 4
Rockland	950	G 7
Rocky R.	11,237	G 9
Rockyridge	358	D 2
Rogers	297	J 4
Rome (Stout)	151	D 8
Rootstown	285	H 3
Roscoe	720	G 5
Rose Farm	250	F 6
Roseville	1,808	F 6
Rosewood	200	C 5
Ross	275	B 9
Rossburg	203	A 5
Rossford	3,963	C 2
Rossmoyne	1,660	C 9
Roswell	267	H 5
Roundhead	185	C 4
Roxabell	103	D 7
Royalton	80	E 6
Rudolph	500	C 3
Rushmore	84	B 4
Rushsylvania	563	C 5
Rushtown	75	D 8
Rushville	252	E 6
Russells Point	909	C 5
Russellville	438	C 8
Russia	200	B 5
Rutland	554	F 7
Sabina	1,696	C 7
Sagamore Hills		J 10
St. Bernard	7,066	B 9
St. Clairsville	3,040	J 5
Saint Henry	715	A 5
Saint Johns	250	B 4
Saint Louisville	336	F 5
Saint Martin	129	C 7
Saint Marys	6,208	B 4
Saint Paris	1,422	C 5
Salem	12,754	J 4
Salesville	187	H 6
Salineville	2,018	J 4
Samantha	50	C 7
Sandusky	29,375	E 3
Sandyville	325	H 4
Santa Fe	200	B 5
Sarahsville	170	H 6
Sardinia	699	C 7
Sardis	344	J 6
Savannah	407	F 4
Sawyerwood	1,585	G 3
Saybrook	125	J 2
Scio	1,152	H 5
Scioto Furnace	275	E 8
Scott	347	A 4
Seaman	736	C 8
Sebring	4,045	H 4
Sedalia	276	D 6
Selma	175	C 6
Senecaville	586	H 6
Seven Hills	1,350	*G 3
Seven Mile	569	A 7
Seville	963	G 3
Shade	60	G 7
Shadeville	118	D 6
Shadyside	4,433	J 6
Shaker Hts.	28,222	H 9
Shalersville	150	H 3
Shandon	250	A 9
Shanesville	460	G 4
Sharon	200	G 6
Sharonville	1,318	C 9
Shauck	300	E 4
Shawnee	1,145	F 6
Shawnee Hills	338	D 5
Shawtown	50	C 3
Sheffield	1,147	F 3
Sheffield L.	2,381	F 3
Shelby	7,971	E 4
Sherrodsville	426	H 4
Sherwood	570	A 3
Shiloh	655	E 4
Short Creek	300	J 5
Shreve	1,287	F 4
Sidney	11,491	B 5
Silica	75	C 2
Silver Lake	1,040	G 3
Silverton	4,827	C 9
Simons	100	J 2
Sinking Spring	187	D 7
Smithfield	1,255	J 5
Smithville	755	G 4
Solon	2,570	J 9
Somerset	1,383	F 6
Somerton	200	H 6
Somerville	383	A 6
Sonora	200	G 6
S. Amherst	1,020	F 3
S. Bloomfield	250	D 6
S. Bloomingville	100	E 7
S. Charleston	1,452	C 6
S. Euclid	15,432	H 9
S. Lebanon	1,291	B 7
South Olive	200	G 6
South Park	75	H 10
South Perry	125	E 6
South Point	804	E 9
South Russell	349	H 3
South Salem	206	D 7
South Solon	414	C 6
South Vienna	424	C 6
South Webster	663	E 8
S. Zanesville	1,477	F 6
Sparta	223	E 5
Spencer	740	F 3
Spencerville	1,826	B 4
Spring Mt.	61	F 5
Spring Valley	645	C 6
Springboro	516	B 6
Springdale	1,200	B 9
Springfield	78,508	C 6
Springhills	190	C 5
Stafford	141	H 6
Starr	50	F 7
Sterling	500	G 4
Steuben	50	E 3
Steubenville	35,872	J 5
Stewart	260	G 7
Stewartsville	350	J 6
Stillwater	250	H 5
Stockdale	270	E 8
Stockport	404	G 6
Stone Creek	225	G 5
Stout	151	D 8
Stoutsville	562	E 6
Stow	2,140	H 3
Strasburg	1,366	G 4
Stratton	467	J 4
Strongsville	3,504	G 10
Struthers	11,941	J 3
Stryker	1,026	B 3
Suffield	200	H 3
Sugar Grove	434	E 6
Sugar Tree Ridge	85	C 7
Sugarcreek	889	G 5
Sullivan	125	F 3
Sulphur Sprs.	300	E 4
Summerfield	368	H 6
Summerford	250	D 6
Summersville	50	D 5
Summitville	150	J 4
Sunbury	936	E 5
Superior	275	E 8
Swanders	50	B 5
Swanton	1,740	C 2
Sycamore	935	D 4
Sylvania	2,433	C 2
Syracuse	700	G 7
Tallmadge	5,821	H 3
Tarlton	371	E 6
Taylorsburg	50	B 6
Taylorsville (Philo)	881	G 6
Tedrow	300	B 2
Temperanceville	70	H 6
Terrace Park	1,265	D 9
Texas	100	C 3
Thackery	100	C 5
The Plains	700	F 7
Thompson	150	H 2
Thornville	432	F 6
Thurman	142	F 8
Thurston	454	E 6
Tiffin	18,952	D 3
Tiltonsville	2,202	J 5
Timberlake	236	J 8
Tipp City	3,304	B 6
Tiro	335	E 4
Tiverton	50	F 5
Tobasco	250	D 10
Toledo	303,616	D 2
Tontogany	368	C 3
Torch	200	G 7
Toronto	7,253	J 5
Trail	100	G 4
Tremont City	396	C 5
Trenton	987	B 7
Trilby	2,750	C 2
Trimble	566	F 7
Trinway	500	F 5
Trotwood	1,066	B 6
Trowbridge	90	D 2
Troy	10,661	B 5
Tuppers Plains	225	G 7
Tuscarawas	700	H 5
Twinsburg	1,200	J 10
Uhrichsville	6,614	H 5
Union	370	B 6
Union City	1,622	A 5
Union Furnace	200	F 7
Unionport	350	J 5
Uniontown	600	H 4
Uniontown (Fultonham)	232	F 6
Unionville	500	J 2
Unionville Ctr.	237	D 5
Uniopolis	271	B 4
Unity	140	J 4
University Heights	11,566	J 9
Upper Arlington	9,024	D 6
Upper Sandusky	4,397	D 4
Urbana	9,335	C 5
Urbancrest	823	D 6
Utica	1,510	F 5
Valley City	250	G 3
Valley View	998	*G 3
Valley View	611	*D 6
Van Wert	10,364	A 4
Vanatta	110	E 5
Vanburen	308	C 3
Vandalia	927	B 6
Vanlue	365	C 4
Vaughnsville	216	B 4
Venedocia	170	B 4
Venice	300	E 3
Vermilion	2,214	F 3
Vermilion-on-the-Lake	614	F 3
Verona	426	A 6
Versailles	1,812	A 5
Vickery	200	D 3
Vienna	500	J 3
Vienna (South Vienna)	424	C 6
Vigo	110	E 7
Villa	70	C 6
Vincent	300	G 7
Vinton	378	F 8
Wabash	150	A 4
Wadsworth	7,966	G 3
Wainwright	500	G 5
Waite Hill	305	H 2
Wakefield	150	E 8
Wakeman	620	F 3
Walbridge	1,152	C 2
Waldo	356	D 5
Walhonding	120	F 5
Walnut Creek	225	G 4
Wamsley	50	D 8
Wapakoneta	5,797	B 4
Warner	175	H 6
Warren	49,856	J 3
Warrensburg	80	D 5
Warrensville		H 9
Warrensville Heights	4,126	J 9
Warsaw	484	G 5
Warwick	320	G 4
Washington Ct. House	10,560	D 6
Washington (Old Washington)	322	H 5
Washingtonville	848	*J 4
Waterford	317	G 6
Waterloo	125	F 8
Watertown	177	G 7
Waterville	1,110	C 3
Wauseon	3,494	B 2
Waverly	1,679	D 7
Wayland	235	H 3
Wayne	761	C 3
Waynesburg	1,258	H 4
Waynesfield	733	C 4
Waynesville	1,016	B 6
Webster	210	B 5
Wellington	2,992	F 3
Wellston	5,691	F 7
Wellsville	7,854	J 4
Welshfield	125	H 3
W. Alexandria	1,183	A 6
W. Andover	200	J 2
W. Carrollton	2,876	B 6
W. Chester	321	C 9
W. Clarksfield	70	E 3
West Elkton	297	A 6
W. Farmington	579	J 3
W. Jefferson	1,647	D 6
W. Lafayette	1,346	G 5
West Leipsic	304	B 3
W. Liberty	1,397	C 5
W. Manchester	469	A 6
W. Mansfield	756	C 5
W. Millgrove	180	*C 3
W. Milton	2,101	B 6
West Point	45	E 4
West Portsmouth	2,613	D 8
W. Richfield	750	G 3
W. Rushville	152	*E 6
West Salem	860	F 4
West Sonora	200	A 6
West Union	1,508	C 8
West Unity	827	B 2
Westboro	100	C 7
Westerville	4,112	D 5
Westlake	4,912	G 9
Westminster	270	B 4
Weston	973	C 3
Westview	625	G 10
Wharton	392	D 4
Wheelersburg	1,013	E 8
Whipple	170	H 6
White Cottage	400	F 6
Whitehall	4,877	E 6
Whitehouse	849	C 2
Wickliffe	5,002	J 9
Wilkesville	203	F 7
Willard	4,744	E 3
Williamsburg	1,490	B 7
Williamsfield	120	J 2
Williamsport	631	D 6
Williamsport	97	E 4
Willoughby	5,602	J 8
Willowick	3,677	G 2
Willshire	567	A 4
Wilmington	7,387	C 7
Wilmot	354	G 4
Winchester	690	C 8
Windham	3,968	H 3
Windsor	170	J 2
Winesburg	195	G 4
Winkle	109	C 7
Winona	200	J 4
Winterset	122	H 5
Wintersville	1,950	J 5
Withamsville	300	B 7
Woodington	75	A 5
Woodlawn	1,335	C 9
Woodmere	419	J 9
Woodsfield	2,410	H 6
Woodstock	316	D 5
Woodville	1,358	D 3
Wooster	14,005	G 4
Worthington	2,141	E 5
Wren	278	A 4
Wright View	2,500	B 6
Wyandot	75	D 4
Wyoming	5,582	C 9
Xenia	12,877	C 6
Yankee Lake	53	*J 3
Yellow Bud	300	D 7
Yellow Sprs.	2,896	C 6
York	100	D 5
Yorkshire	142	B 5
Yorkville	1,854	J 5
Youngstown	168,330	J 3
Zaleski	388	F 7
Zanesfield	288	C 5
Zanesville	40,517	G 6
Zoar	200	H 4
Zoarville	250	H 4

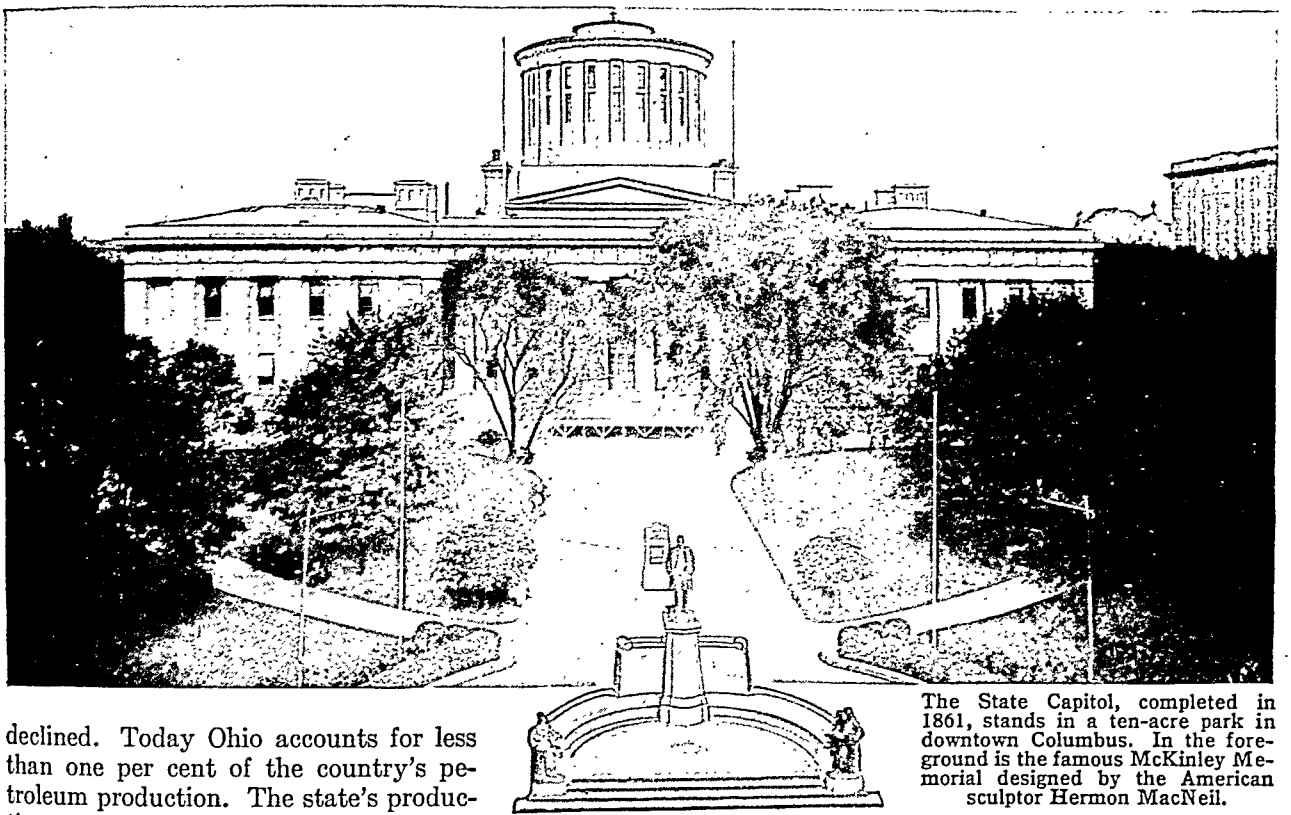
*No room on map for name.

FOUR IMPORTANT OHIO CITIES



Ohio is conspicuous for the number of its great industrial cities. 1. Toledo, on Lake Erie at the mouth of the Maumee River, is a center for the manufacture of automobile accessories. 2. Akron is known as the world's "rubber capital." 3. Columbus, Ohio's capital, is noted for manufacturing steel, machinery, and shoes. 4. Cincinnati, on the Ohio River, is an art and musical center as well as a maker of machine tools, electrical equipment, and soap.

THE WEST FRONT OF THE STATE CAPITOL AT COLUMBUS



The State Capitol, completed in 1861, stands in a ten-acre park in downtown Columbus. In the foreground is the famous McKinley Memorial designed by the American sculptor Hermon MacNeil.

declined. Today Ohio accounts for less than one per cent of the country's petroleum production. The state's production of natural gas is about 40 billion cubic feet a year. This fuel comes mainly from natural-gas fields in the eastern half of the state. Ohio also produces important supplies of coal.

Manufactures and Largest Cities

Ohio ranks second among all states in the total value of its manufacturing. One out of every three workers is employed in one of the state's 12,000 manufacturing establishments. The state's largest industry, as well as the one in which it leads all other states, is the manufacture of machinery. It makes metalworking, refrigeration, and industrial equipment of all types.

Ohio also leads in the manufacture of structural metals, metal stampings, and other fabricated metal products. It ranks second in primary metals. This includes the output of the state's numerous blast furnaces, steel mills, and foundries. In both transportation equipment and electrical machinery, Ohio ranks third in the nation.

The state's largest city and greatest manufacturing center is Cleveland. Using the iron ore and coal that come to the huge lake-front docks, the city's mills and factories turn out a wide variety of iron, steel, and other metal products, and machinery (*see* Cleveland). Cincinnati, once the "pork capital of America," is still a meat-packing center. But the value of its output of machinery and machine tools now exceeds that of its packing plants. It also manufactures many other kinds of goods including soap, malt liquors, and men's and women's clothing (*see* Cincinnati).

Columbus, the state capital, specializes in industrial machinery, iron and steel products, and shoes (*see* Columbus). Toledo is one of the leading glass manufacturing centers in the nation. It also manufactures automobiles, machinery, and steel (*see* Toledo).

Akron is noted for its factories which make tires and tubes and other rubber products (*see* Akron). Dayton is famous for its aircraft laboratories and manufacture of cash registers (*see* Dayton). Youngstown and Canton are great steel-producing cities. They also make electrical machinery, rubber goods, and many other products (*see* Canton; Youngstown).

Ohio is known for its clay products. An immense amount of white ware is made in Cincinnati, Zanesville, Coshocton, and East Liverpool. East Liverpool makes a large proportion of the white granite ware and semivitreous porcelain of the United States. Zanesville and Coshocton are noted for art wares. Cincinnati is world-famous for its Rookwood ware.

In 1952, the Atomic Energy Commission selected a 6,500-acre site, north of Portsmouth in Pike County, for an atomic plant to make uranium 235. This is a major atomic installation in the nation.

Farm Products of the "Buckeye State"

Ohio is also an important agricultural state, ranking among the first dozen states in total cash income from farm products. The state's 200,000 farms have an average of about 105 acres each. The principal field crops are corn, wheat, hay, and soybeans. Like other states in the corn belt where grain is plentiful, Ohio is an important producer of cattle, hogs, and poultry. A large part of the farm land is in pasture, and dairy products have a profitable market in the state's many industrial centers. In addition to

its main farm products, the state raises oats, potatoes, truck crops, fruit, and some tobacco.

Ohio's agriculture has depended greatly upon the development of transportation. In the early days the farmer in the state's interior could get very little cash from raising and selling corn and wheat because the costs of transporting the grain to market were so high. Before the opening of the Ohio and Erie Canal, corn sold along its route for 10 cents and wheat for 25 cents a bushel. The farmer used much of his grain to feed his hogs and cattle. He then drove this livestock to the nearest river to be sold and loaded on boats and barges. With the building of canals, and later of railroads and highways, and with the growth of towns and cities, Ohio farmers have had excellent means for sending their crops and livestock to market and for receiving city-made goods.

Education and Government

In 1914 Ohio adopted a vastly improved system of county school organization. Today many of its city and centralized rural schools are among the best in the nation. The state's institutions of higher education include Ohio State University at Columbus, four other state universities, and one college of education and industrial arts. Ohio University, at Athens, is the pioneer college of the Old Northwest.

Western Reserve University, at Cleveland, has been called the "Yale of the West." Oberlin was the first coeducational college in the United States. It took a notable part in the antislavery movement. The University of Cincinnati is among the nation's foremost municipal universities.

Ohio as a state has been a leader in certain lines of advanced social and industrial legislation and administration, such as the promotion of safety in factories. Since 1912 the initiative and referendum have been a part of the state constitution.

Some of Ohio's Famous Citizens

Ohio is proud of the noted men and women who were born in the state or who achieved fame there. The state's distinguished citizens include seven presidents of the United States and such statesmen as Newton D. Baker, Salmon P. Chase, Charles G. Dawes, and E. M. Stanton. Other notables are soldiers—Putnam, Sherman, Sheridan; inventors—Wilbur and Orville Wright; writers—Sherwood Anderson, Louis Bromfield, Zane Grey, William D. Howells, Fannie Hurst, Whitelaw Reid, James Thurber; poets—Alice and Phoebe Cary, Paul L. Dunbar; educators—William McGuffey, Horace Mann; financiers—Jay Cooke, Marcus Hanna; and lawyers—Florence Allen, Clarence Darrow.

History of the State

When the first white men came to the Ohio region they saw a few small patches of open prairie and large forests containing oak, hickory, walnut, and numerous buckeye, or horse-chestnut, trees. For the buckeyes, Ohio was later nicknamed the "Buckeye State."

The first settlement was made in 1788 at the mouth of the Muskingum River. There a group called the "Ohio Company of Associates" founded the town of Marietta. Led by Gen. Rufus Putnam, they were chiefly New England veterans of the American Revolution. In the same year the town that later took the name of Cincinnati was founded on the Ohio River.

In 1796 a company of Connecticut men founded Cleveland on land along Lake Erie called the Western Reserve. This strip had been reserved by Connecticut when it surrendered its other claims to lands in the west (*see* Connecticut). People began settling so fast in the Ohio region and in other parts of the Northwest Territory that a territorial legislature was established in 1799 (*see* Northwest Territory).

For a long time historians differed on the date that Ohio became a state. Congress passed an enabling act on April 30, 1802. A convention at Chillicothe on Nov. 29, 1802, adopted a constitution. Congress extended federal laws over the state on Feb. 19, 1803. Ohio's first legislature convened at Chillicothe on March 1, 1803. The state legislature in a resolution in 1902 accepted March 1, 1803, as the date that Ohio entered the Union, and Congress did likewise in a resolution passed in 1953.

For years Ohio's northern boundary was in dispute. Both Ohio and Michigan claimed an area including Toledo. The controversy resulted in the "Toledo War." The militia of both states was called out and war threatened. In 1836 Congress awarded the area to Ohio and gave Michigan the Upper Peninsula.

Ohio was a nonslavery state by terms of the Ordinance of 1787. The state was first settled by people from New England and Middle Atlantic states, who were strongly antislavery. They aided slaves to make their way to Canada through the "underground railroad." During the Civil War, Ohio furnished 340,000 men to the Union, about half the state's able-bodied men. (*See also* chronology in Ohio Fact Summary; United States, section "North Central Plains.")

OHIO RIVER. Of the two great tributaries that flow into the Mississippi, the Ohio, though shorter in length, is vastly more important than the Missouri. The Ohio drains a smaller basin but discharges more water than the Missouri. It traverses 981 miles and drains 203,900 square miles in 14 states in the nation's greatest industrial and farming region (for drainage basin map, *see* United States). It serves such mighty industrial centers as Pittsburgh, Wheeling, Cincinnati, and Louisville. It taps extensive coal fields along its course and carries petroleum from oil fields in the southwestern United States to refineries and markets in the East. Fleets of barges and diesel towboats carry coal, coke, oil, gasoline, stone, cement, sand and gravel, lumber, and iron and steel.

Two canals, now abandoned, once connected the Ohio with Lake Erie—one from Portsmouth by way of Columbus to Cleveland, the other from Cincinnati by way of Dayton to Toledo.

This useful river is formed by the junction of the Allegheny and Monongahela rivers at Pittsburgh in Pennsylvania. It flows southwesterly to Cairo, Ill., where it empties into the Mississippi. It is the

northwestern boundary of West Virginia, the northern boundary of Kentucky, and the southern boundary of Ohio, Indiana, and Illinois. Its principal tributaries are the Muskingum, Scioto, Miami, Little Miami, Beaver, and Wabash from the north; and the Kanawha, Little Kanawha, Big Sandy, Licking, Kentucky, Green, Cumberland, and Tennessee from the south.

The picturesque Ohio sweeps in majestic curves. Through grain fields and wooded hills, it twists and turns until it almost encircles some spots. Numerous islands, some under cultivation, divide the waters of the river. Of these the most famous is Blennerhassett, near Parkersburg, W. Va. It was the site of Aaron Burr's alleged treason plot (*see* Burr).

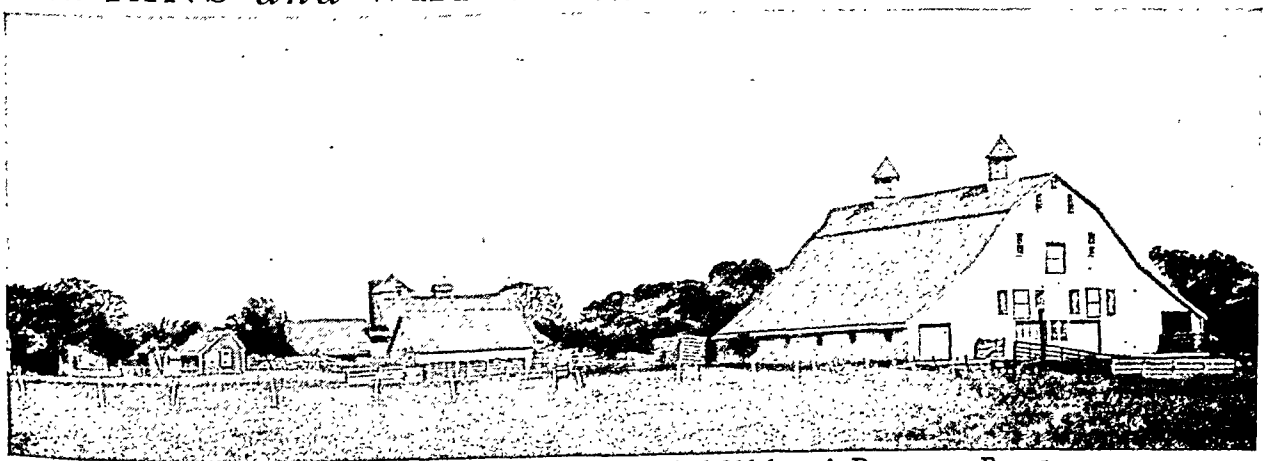
The Ohio has caused many disastrous floods. The most serious were in 1913, 1936, and again in 1937, when there was 410 million dollars damage. Floods can be severe because the basin lies in a path of North American storms. Steep-sided mountains, narrow valleys, and rain falling on melting snow aggravate floods. Damage is high because many cities lie along the river. Since 1936 Congress has authorized flood control projects, including reservoirs and levees, at a cost of 1½ billion dollars.

Formerly the river was impeded by falls, sandbars, and snags, and from June to November the waters were too low for navigation. After vast expenditures on engineering projects, the Ohio is now virtually one long canal, with a channel 9 feet deep and 500 to 750 feet wide. Its bank-to-bank width varies from 890 feet near Pittsburgh to 5,910 feet near its mouth. There are 46 dams and locks. At the Falls of the Ohio (actually rapids), near Louisville, Ky., the chief navigation hazard has been removed by building a dam and a canal around the falls, together costing $15,758,000. A hydroelectric plant operates at the dam. The river's average flow is three miles an hour. Thirty-seven miles from its mouth, the average discharge is 248,600 cubic feet a second.

La Salle may have discovered the Ohio, about 1670, when he is supposed to have descended it at least as far as Louisville. The river remained little known until it became important in the struggle for the interior between the French and English, with the English gaining control in 1763. After 1768, settlers from Virginia followed the river. Ten years later, George Rogers Clark set out from the falls at Louisville for the conquest of Forts Kaskaskia and Vincennes.

In 1783 the Ohio country became a part of the United States, and in 1787 the organization of the Northwest Territory opened the region to settlers. The first great tide of western immigration swept along this course. The first steamboat descended from Pittsburgh in 1811, and until the Civil War steamboat traffic on the Ohio was important to the Middle West. Even now the river carries about 50 million tons of freight a year.

INDIANS *and* WHITES *in* OKLAHOMA'S HISTORY



Well-kept Buildings and Fields Are Typical of Oklahoma's Prosperous Farms

OKLAHOMA. Youthful, vigorous Oklahoma—it sprang full-grown into being. For half a century the tide of white immigration surged about its boundaries without being able to enter. Then in 1889 the Federal government opened the land, and the flood poured in.

Until 1889 the entire country was known as Indian Territory. It was an area reserved as a last home for various tribes of red men who had been driven there from the southern and western states. They had been assigned all but a small portion in the center of the area—a part known as the original "Oklahoma," which in the language of the Choctaw Indians meant "red people." For years white settlers wanted to get land in this portion of the public domain. Finally Congress fixed the date upon which they might enter to stake out homesteads and other claims. The date set was April 22, 1889.

Some of these land-hungry people had put all their money into obtaining the best horses they could find. Others had slower-moving ponies and mules. Still others had covered wagons or carriages. A few were lucky enough to have tickets on the Santa Fe Railroad, the only line then penetrating the Oklahoma country. Many, less fortunate than the rest had to travel on foot.

THE VIGOROUS YOUNG STATE OF OKLAHOMA



From its highest point in the extreme northwest, Oklahoma slopes gently downward to the south and southeast. The lowest point is on the Red River in the extreme southeast. The state's great shelving plain is broken by a few highland areas—the Wichita Mountains in the southwest, the Arbuckle Mountains in the south central part, and the Ouachitas in the southeast.

At noon April 22, 1889, a shot signaled that the area was open to settlement. The first "Oklahoma run" was on. Many tried to get to the best land *sooner* than the official opening day. From this came the nickname, the "Sooner State."

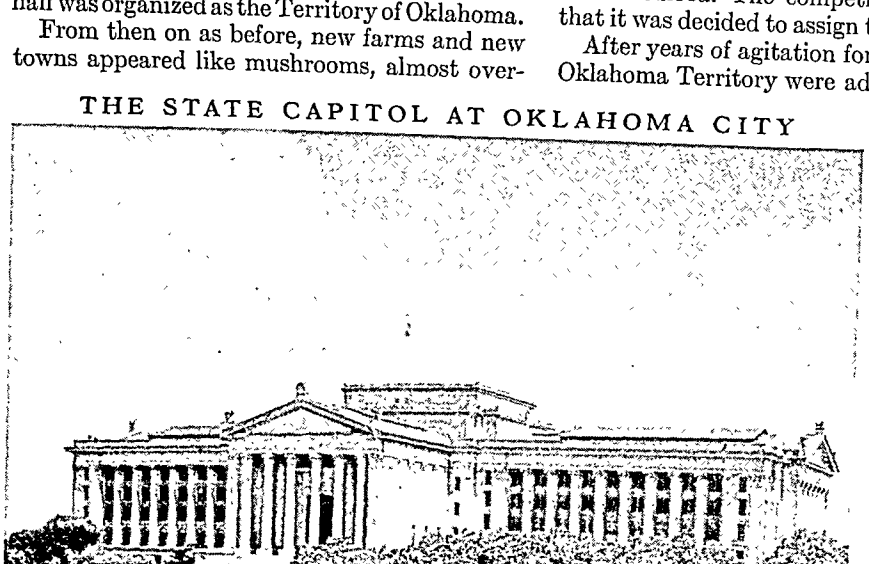
Shortly after the gun smoke had cleared away, the leaders on the fastest horses were out of sight. The multitude followed, spreading out over the vast prairie. All eagerly staked out their claims to land.

Towns sprang up before night. On the first evening thousands camped on the sites of Guthrie and Oklahoma City. In a week a new part of the nation's West had been created. Settlers continued to pour in from neighboring states. For nearly a year there was no area-wide government. In March 1890 the western half was organized as the Territory of Oklahoma.

From then on as before, new farms and new towns appeared like mushrooms, almost overnight. As new areas were opened for settlement at various times, the population went up at an extraordinary rate. To increase the land available to settlers, the Federal government made individual allotments to the Indians and bought up the surplus land in their reservations—much of it for as low as 15 cents an acre. As a result, several more "runs" for land occurred. The competition for claims became so keen that it was decided to assign them by a system of drawing lots.

After years of agitation for statehood, Indian Territory and Oklahoma Territory were admitted to the Union as the 46th state on Nov. 16, 1907. In 1890 when the first census was taken, what is now Oklahoma had a population of nearly 260,000. In 1950 the state had more than 2,200,000 residents, almost nine times as many people as it had 60 years before.

THE STATE CAPITOL AT OKLAHOMA CITY



The State Capitol at Oklahoma City is built in the form of a cross. This view shows the main entrance on the south side. Construction was begun in 1914 and completed in 1917.

Oil—Riches Underground

The remarkable growth in Oklahoma's population was due not only to farm land but also to oil land. Petroleum fields had been discovered in Indian Territory, the eastern half of the present state, as early as 1890. There was, however, little attempt to develop these fields until 1903, when the first "oil boom" began. The greatest development of the oil industry occurred after 1910 as the number of automobiles in use throughout the country increased rapidly. They required vast quantities of

Continued on page 373

Oklahoma Fact Summary

OKLAHOMA (Okla.): Name from Choctaw Indian words, *okla*, "people," and *humma* or *homma*, "red." **Nickname:** "Sooner State," because in illegal effort to get the best land, some settlers crossed the border "sooner" than April 22, 1889, when Oklahoma was opened for settlement.

Seal: Large five-pointed star on the background of 45 small stars. Each ray of the large star bears a symbol of one of the famous Five Civilized Tribes of Indians: the Chickasaw, Choctaw, Seminole, Cherokee, and Creek.

Motto: Labor Omnia Vincit (Labor Conquers All Things).

Flag: For description and illustration, *see* Flags.

Flower: Mistletoe. **Bird:** Scissor-tailed flycatcher. **Tree:** Redbud. **Song:** 'Oklahoma', words and music by Richard Rodgers and Oscar Hammerstein II.

THE GOVERNMENT



Capital: Oklahoma City (since 1910).

Representation in Congress: Senate, 2; House of Representatives, 6. Electoral votes, 8.

State Legislature: Senators, 44; term, 4 years. *Representatives, 114 to 120;* term, 2 years. Convenes Tuesday after first Monday in January in the odd-numbered years. No limit to session.

Constitution: Adopted 1907. Proposed amendment may be (a) passed by a majority vote of both legislative houses, or by initiative action of the people, and (b) ratified by a majority vote at a popular election.

Governor: Term, 4 years. May not succeed himself.

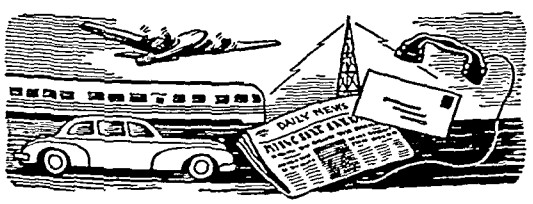
Other Executive Officers: Lieutenant governor, secretary of state, attorney general, treasurer, auditor, all elected; terms, 4 years.

Judiciary: Supreme court—9 justices, elected at large; term, 6 years. Criminal court of appeals—3 judges elected; term, 6 years. District courts—24; judges elected; term, 4 years. County courts—1 in each county; judges elected; term, 2 years.

County: 77 counties, each governed by a board of commissioners, elected by districts; term, 2 years.

Municipal: City-manager plan most common; some cities have mayor-council plan.

Voting Qualifications: Age, 21; residence in state, 1 year; in county, 6 months; in district, 30 days.



TRANSPORTATION AND COMMUNICATION

Transportation: Railroads, 6,000 miles. First railroad, Missouri-Kansas-Texas line (Chetopa, Kansas, to Vinita), 1871. Rural roads, 92,000 miles. Airports, 147.

Communication: Periodicals, 112. Newspapers, 312. First newspaper, *Cherokee Advocate*, Tahlequah, 1844. Radio stations (AM and FM), 53; first station, WKY, Oklahoma City, licensed April 21, 1921. Television stations, 3; first station, WKY-TV, Oklahoma City, began operation June 6, 1949. Telephones, 644,800. Post offices, 845.

THE PEOPLE AND THEIR LAND

Population (1950 census): 2,233,351 (rank among 48 states—25th); urban, 51.0%; rural, 49.0%. Density: 32.4 persons per square mile (rank—33d state).

Extent: Area, 69,919 square miles, including 888 square miles of water surface (17th state in size).

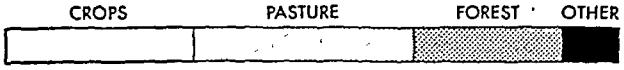
Elevation: Highest, Black Mesa, 4,978 feet, in extreme northwest corner of the panhandle; lowest, Red River, at southeast corner of state, 300 feet.

Temperature (°F.): Average—annual, 61°; winter, 40°; spring, 60°; summer, 81°; fall, 62°. Lowest recorded, −27° (Watts, Jan. 18, 1930, and other locations and earlier dates); highest recorded, 120° (Tishomingo, July 26, 1943, and other locations and earlier dates).

Precipitation: Average (inches)—annual, 33; winter, 5; spring, 10; summer, 10; fall, 8. Varies from about 18 in extreme northwest to about 56 in southeast.

Natural Features: Deep, narrow valleys, clear brooks, hills (Ozark Plateau); parallel ridges, spring-fed streams (Ouachita Mountain area); remarkable variety of rocks (Arbuckle Mountains); high, level tableland (Panhandle). Principal rivers: Arkansas, Canadian, Cimarron, Kiamichi, Grand (Neosho), North Canadian, Red, Verdigris, Washita.

Land Use: Cropland, 31%; nonforested pasture, 36%; forest, 24%; other (roads, parks, game refuges, wasteland, cities, etc.), 9%.



Natural Resources: *Agricultural*—fertile soil, varied rainfall for great variety of crops. *Industrial*—petroleum, natural gas. *Commercial*—central location for southwestern industries and farm products; vacation land.

OCCUPATIONS AND PRODUCTS

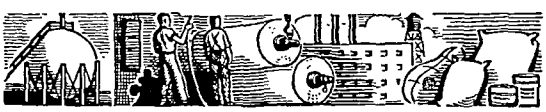
What the People Do to Earn a Living



Major Industries and Occupations, 1950

Fields of Employment	Number Employed	Percentage of Total Employed
Agriculture, forestry, and fishery	155,156	20.6
Wholesale and retail trade	150,071	19.9
Manufacturing	74,119	9.8
Professional services (medical, legal, educational, etc.)	67,920	9.0
Construction	58,350	7.7
Transportation, communication, and other public utilities	53,114	7.0
Personal services (hotel, domestic, laundering, etc.)	49,087	6.5
Government	40,724	5.4
Mining	39,611	5.3
Finance, insurance, and real estate	22,361	3.0
Business and repair services	20,920	2.8
Amusement, recreation, and related services	7,990	1.1
Workers not accounted for	14,088	1.9
Total employed	753,511	100.0

Oklahoma Fact Summary

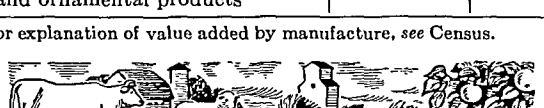


What the People Produce

A. Manufactured Goods (Rank among states—32d)
Value added by manufacture* (1952), $493,379,000

Leading Industries in 1947 (with Principal Products)	Value Added by Manufacture	Rank among States
PETROLEUM AND COAL PRODUCTS . . Petroleum refining	$79,875,000	9
FOOD AND KINDRED PRODUCTS . . . . . Flour and meal; meat packing; bakery products; beverages	75,969,000	28
MACHINERY (EXCEPT ELECTRICAL) . Oil-field machinery and tools	37,134,000	19
PRINTING AND PUBLISHING . . . . . Newspapers; commercial printing	27,542,000	23
STONE, CLAY, AND GLASS PRODUCTS Glass containers; concrete and plaster products	23,411,000	20
FABRICATED METAL PRODUCTS . . . . . Boiler shop products; structural and ornamental products	18,862,000	26

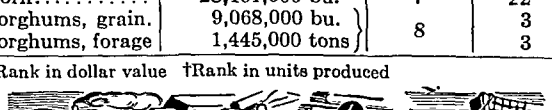
*For explanation of value added by manufacture, *see* Census.



B. Farm Products (Rank among states—16th)
Total cash income (1952), $682,100,000

Products	Amount Produced (10-Year Average)	Rank within State*	Rank among States†
Cattle	708,066,000 lbs.	1	9
Wheat	73,998,000 bu.	2	3
Milk	1,147,000,000 qts.	3	15
Cotton lint	511,000 bales	4	11
Hogs	305,460,000 lbs.	5	16
Eggs	110,000,000 doz.	6	15
Corn	28,461,000 bu.	7	22
Sorghums, grain.	9,068,000 bu.	8	3
Sorghums, forage	1,445,000 tons		3

*Rank in dollar value †Rank in units produced



C. Minerals (Fuels, Metals, and Stone)
Annual value (1951), $607,485,000
Rank among states—6th

Minerals (1951)	Amount Produced	Value
Petroleum	186,869,000 bbls.	$480,250,000
Natural-gas liquids	17,542,000 bbls.	39,934,000
Natural gas	538,756,000,000 cu. ft.	28,554,000
Zinc	53,000 tons	19,456,000
Coal	2,223,000 tons	13,873,000
Stone	6,967,000 tons	6,918,000

D. Trade

Trade (1948)	Sales	Rank among States
Wholesale	$1,739,200,000	27
Retail	1,640,015,000	26
Service	146,128,000	23

EDUCATION



Public Schools: Elementary, 2,694; secondary, 989. Compulsory school age, 7 through 17. State Board of Education composed of state supt. of public instruction popularly elected for 4-year term, and six members appointed by the governor for 6-year terms. County supts. elected for 2-year terms. City boards of education, popularly elected, appoint city supts. of schools.

Private and Parochial Schools: 111.

Colleges and Universities (accredited): Colleges, white, 16; Negro, 1. Junior colleges, 10. State-supported schools include the Univ. of Okla., Norman; Okla. College for Women, Chickasha; Okla. A and M, Stillwater; Panhandle A and M, Goodwell; Okla. Military Academy, Claremore; Langston Univ. (Negro), Langston; 6 state colleges—East Central, Ada; Northwestern, Alva; Central, Edmond; Southeastern, Durant; Northeastern, Tahlequah; Southwestern, Weatherford; 7 junior colleges, located throughout the state.

Special State Institutions: Whitaker State Home, Pryor; Oklahoma School for the Blind, Muskogee; Oklahoma School for the Deaf, Sulphur; the State School for the Deaf, Blind and Orphans' Institute (Negro), Taft.

Libraries: City and town public libraries, 91. Independent county library systems, 1; 6 counties contract for service with city libraries. Library extension service to schools, communities, and the blind. Noted special libraries: Oklahoma Historical Society, Oklahoma City; Geological Survey Library and Univ. of Oklahoma Library, Norman; Field Artillery School Library, Ft. Sill.

Outstanding Museums: Woolaroc Museum, near Bartlesville; Museum of Art and Museum of Zoology, both at Univ. of Oklahoma, Norman; Oklahoma Art Center and Oklahoma Historical Society Museum, both at Oklahoma City; Philbrook Art Center, Tulsa.

CORRECTIONAL AND PENAL INSTITUTIONS

Training School for White Boys, Stringtown; Industrial School for White Girls, Tecumseh; Training School for Negro Boys, Boley; Training School for Negro Girls, Taft; State Reformatory, Granite; State Penitentiary, McAlester.

PLACES OF INTEREST*

Callixylon Tree—in Ada; giant fossilized tree stump, millions of years old (20).

Cypress Tree—huge cypress near Eagletown; 56 feet in diameter; has lightning rod for protection (27).

Devil's Den—natural park north of Tishomingo (24).

Dinosaur Quarry—fossil remains of prehistoric dinosaurs; in the extreme northwest near Kenton (1).

Fort Gibson—restoration of historic fort built in 1824; national cemetery nearby (14).

Fort Sill—remains of old army post; museum of relics of Indian wars; U. S. Army artillery center (19).

Fort Supply Reservoir—lake constructed primarily for flood control on Wolf Creek near Woodward (7).

Glass Mountain—west of Orienta; mountain covered with tiny crystals, making the slopes glitter in the sun (9).

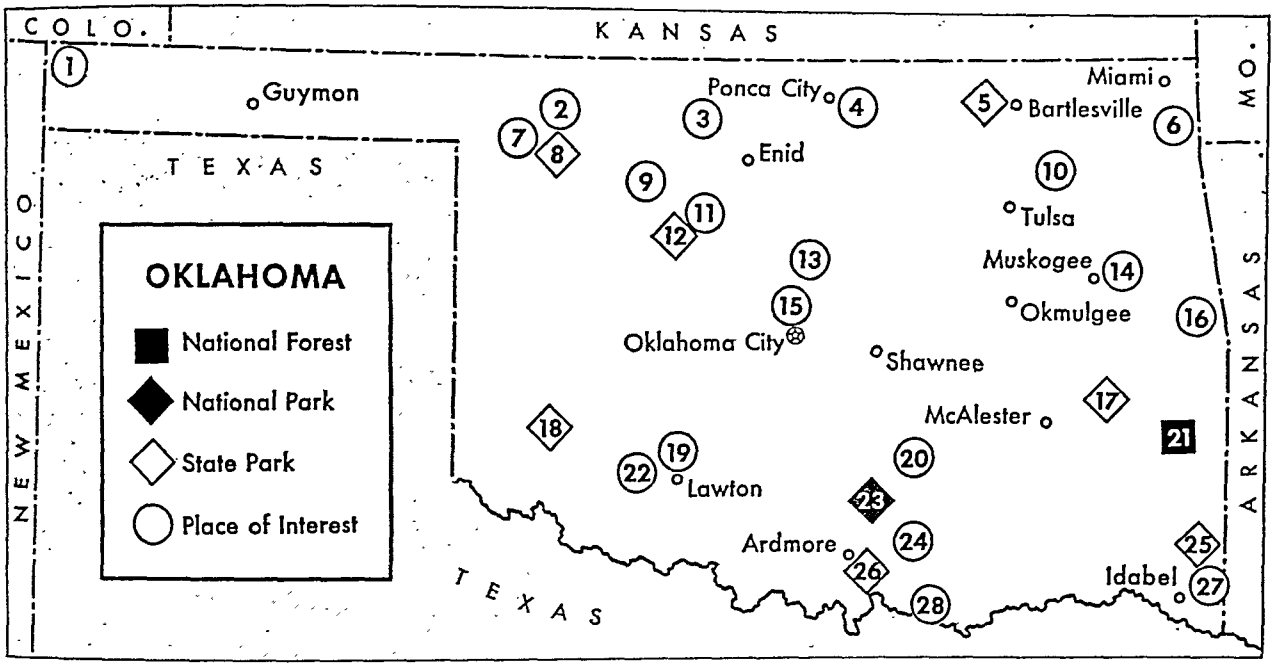
Great Salt Plain Reservoir—lake on Salt Fork of the Arkansas River near Cherokee; wild-fowl refuge (3).

Guthrie—capital of Oklahoma Territory (1890–1907) (13)

Lake o' the Cherokees (Grand Lake)— near Vinita; formed by Grand River (Pensacola) Dam (6).

*Numbers in parentheses are keyed to map.

Oklahoma Fact Summary



Lake Texoma—reservoir of Denison Dam; recreational area on Red River; near Madill on Texas line (28).
Murrell Home—near Tahlequah; historic pre-Civil War mansion (1845), in Cherokee settlement; n. e. of (14).
Oklahoma City—State Capitol; State Historical Society; Civic Center (*see* Oklahoma City) (15).
Pioneer Woman Statue—east of Ponca City; bronze memorial honoring early women pioneers (4).
Salt Creek Canyon—e. of Canton; canyons; caves (11).
Sequoyah's Home—north of Muldrow; log cabin of famed inventor of Cherokee alphabet (16).
Turner Falls—near Davis; in Arbuckle Mts.; n. of (26).
Tulsa—oil wells; Philbrook Art Center (*see* Tulsa).
Wichita Mountains Wildlife Refuge—west of Medicine Park; buffalo, elk, deer, Texas longhorns (22).
Will Rogers Memorial—west of Claremore; museum dedicated to the memory of the famous humorist (10).

STATE PARKS*

Alabaster Caverns—state's largest cave; many bats; at (2).
Beavers Bend—1,300 acres along Mountain Fork River; wide variety of trees, wild flowers, animal life (25).
Boiling Springs—once pioneer watering place (8).
Greenleaf Lake—recreation area; southeast of (14).
Lake Murray—recreational area, largest in state (26).
Lake Tenkiller—water sports; picnicking; n. e. of (17).
Lake Texoma—2,000 acres along lake formed by Denison Dam; west of Durant; north of symbol (28).
Lake Wister—fishing, boating, picnicking; s. e. of (17).
Osage Hills—gorges, glens, bluffs; heavily wooded (5).
Quartz Mountain—rugged granite hills with outcroppings of quartz; bird refuge; east of Mangum (18).
Robbers Cave—named for cavern, supposed hiding place of early robbers; many canyons; game refuge (17).
Roman Nose—named for Cheyenne Indian chief; swimming pool and spring-fed lake north of Watonga (12).
Sequoyah—named for Cherokee educator; on Fort Gibson Reservoir; e. of Wagoner; n. of symbol (14).

NATIONAL PARK*

Platt—912 acres; springs of medicinal (sulfur, iron, bromide) and fresh waters; wild flowers; wildlife (23).

*Numbers in parentheses are keyed to map.

NATIONAL FOREST*

Ouachita—291,509 acres in state; total, 2,424,490 acres in Arkansas and Oklahoma; hdqrs., Hot Springs National Park, Arkansas (21).

LARGEST CITIES (1950 census)

Oklahoma City (243,504): state capital; wholesale distribution center; petroleum production; meat packing.
Tulsa (182,740): "oil capital of the world"; petroleum products and equipment; aluminum trailers; textiles.
Muskogee (37,289): agricultural and industrial center.
Enid (36,017): grain elevators; flour milling; oil refining.
Lawton (34,757): resort city; cement products; Fort Sill.
Norman (27,006): trade center; University of Oklahoma.
Shawnee (22,948): aircraft, electronics, oil, flour center.
Stillwater (20,238): farm processing; oil; state college.
Ponca City (20,180): oil refining; stock-raising center.
Bartlesville (19,228): oil center; zinc smelting; pumps.
Okmulgee (18,317): glass; oil refining; food processing.

THE PEOPLE BUILD THEIR STATE



1541—Coronado crosses what is now Oklahoma; claims land for Spain.
1682—La Salle claims all lands drained by Mississippi (including Oklahoma) for King of France.
1762—Louisiana region ceded by France to Spain; secretly ceded back to France in 1800.
1802—Pierre Chouteau, Jr., a Frenchman, establishes fur-trading rendezvous on site of present Salina.
1803—United States purchases Louisiana from France.
1804—District of Louisiana, including Oklahoma, created under administration of Indiana Territory.
1812—Oklahoma included in Territory of Missouri.
1819—Oklahoma included in Territory of Arkansas; southern limits of Oklahoma fixed at Red River.
1820—Choctaw Indians assigned land in Oklahoma by Treaty of Doak's Stand; they occupy land, 1830.
1821—Sequoyah completes Cherokee alphabet after 12 years of work; moves to Oklahoma, 1828.
1824—Fort Gibson built near mouth of Grand (Neosho) River; Fort Towson laid out on Red River.

Oklahoma Fact Summary

1829—Cephas Washburn opens Dwight Mission to educate Cherokees, near present Marble City.
1830—Congress passes Indian Removal Act to move eastern Indians to Oklahoma (Indian Territory).
1832—Cherokees open schools. Creeks and Seminoles sign treaties to settle in Oklahoma.
1835—Comanches and Wichitas sign treaties with U. S.
1837—Chickasaws surrender their land in the East; begin moving to Oklahoma.
1838—Cherokee Indians in Georgia forced to move to Oklahoma; their hardships make their journey known as the Trail of Tears.
1842—Fort Washita established on Washita R. to protect Chickasaws from unfriendly Southwest tribes.
1849—California gold seekers use trail across Oklahoma.
1850—Texas cedes to U. S. land north of 36° 30′; later forms southern border of Oklahoma Panhandle.
1852—Tahlequah incorporated under Cherokee law; is first incorporated town in Oklahoma.
1854—Oklahoma-Kansas border fixed at 37th parallel.
1861—Many Oklahoma Indians side with Confederacy in Civil War; fierce local skirmishes.
1866—Five Civilized Tribes in treaty with U. S. free their slaves and cede western half of Oklahoma for settlement by other Indians.
1868—Camp Wichita established; becomes Fort Sill, a military base against Plains Indians, 1869.
1872—Commercial coal mining begins at Fort McAlester.
1879—"Boomers" settle illegally in "Oklahoma lands."
1888—James ("Jim") Thorpe, born at Prague, becomes one of greatest athletes in U. S. history.
1889—Homesteaders make first "run" into Oklahoma, April 22. First schools for white children opened. First oil well drilled near Chelsea.
1890—Congress creates a territorial government in western Oklahoma; capital, Guthrie; governor, George W. Steele. Lead and zinc mining begins in Ottawa Co. Panhandle added to Oklahoma territory.
1892—University of Oklahoma established at Norman.
1893—Cherokee Outlet opened to white settlement in greatest "run" of settlers to claim lands.
1896—U. S. Supreme Court awards Greer Co. to Oklahoma after long dispute with Texas. Oil discovered in large quantities near Bartlesville.
1901—Kiowa-Comanche and Wichita lands are last reservations opened to white settlement, August 6.
1905—Five Civilized Tribes try unsuccessfully at Muskogee to found new state to be called Sequoyah.
1906—Platt National Park created. Delegates from Indian and Oklahoma territories meet at Guthrie to draft state constitution. Prohibition adopted.
1907—Oklahoma becomes 46th state, Nov. 16; capital, Guthrie; first governor, Charles N. Haskell.
1910—State capital moved to Oklahoma City.
1920—Oil production begins in Osage Co.; soon makes Osage Indians rich.
1928—Oklahoma City oil field opened.
1935—Will Rogers, famed humorist born 1879 at Claremore, killed in airplane crash in Alaska.
1940—Grand River (Pensacola) Dam completed.
1943—Denison Dam on Red R. completed, one of world's largest in volume; forms Lake Texoma, one of world's greatest reservoirs in volume and area.
1949—Legislature authorizes admission of Negro students to state university.
1951—Government employees required to sign loyalty oaths. Flood-control dams completed forming Hulah Reservoir on Caney River and Tenkiller Ferry Reservoir on Illinois River.
1953—Turner Turnpike, Oklahoma City-Tulsa, opens. Oklahoma receives federal aid in severe drought.
1954—Dust storms cause wind erosion damage. Voters approve extensions of Turner Turnpike toward Joplin, Mo., Wichita, Kan., and Wichita Falls, Tex.

THE FIRST RUN FOR THE RICH LANDS OF OKLAHOMA



In 1889, when the official gunshot signaled the opening of the Oklahoma country to settlement, thousands of homesteaders rushed across the boundary. They came on horseback, mule-back, bicycles, in covered wagons—even on foot—to stake out claims to the free public land. This painting, 'Opening of Oklahoma Territory', is by Robert O. Lindneux.

OKLAHOMA

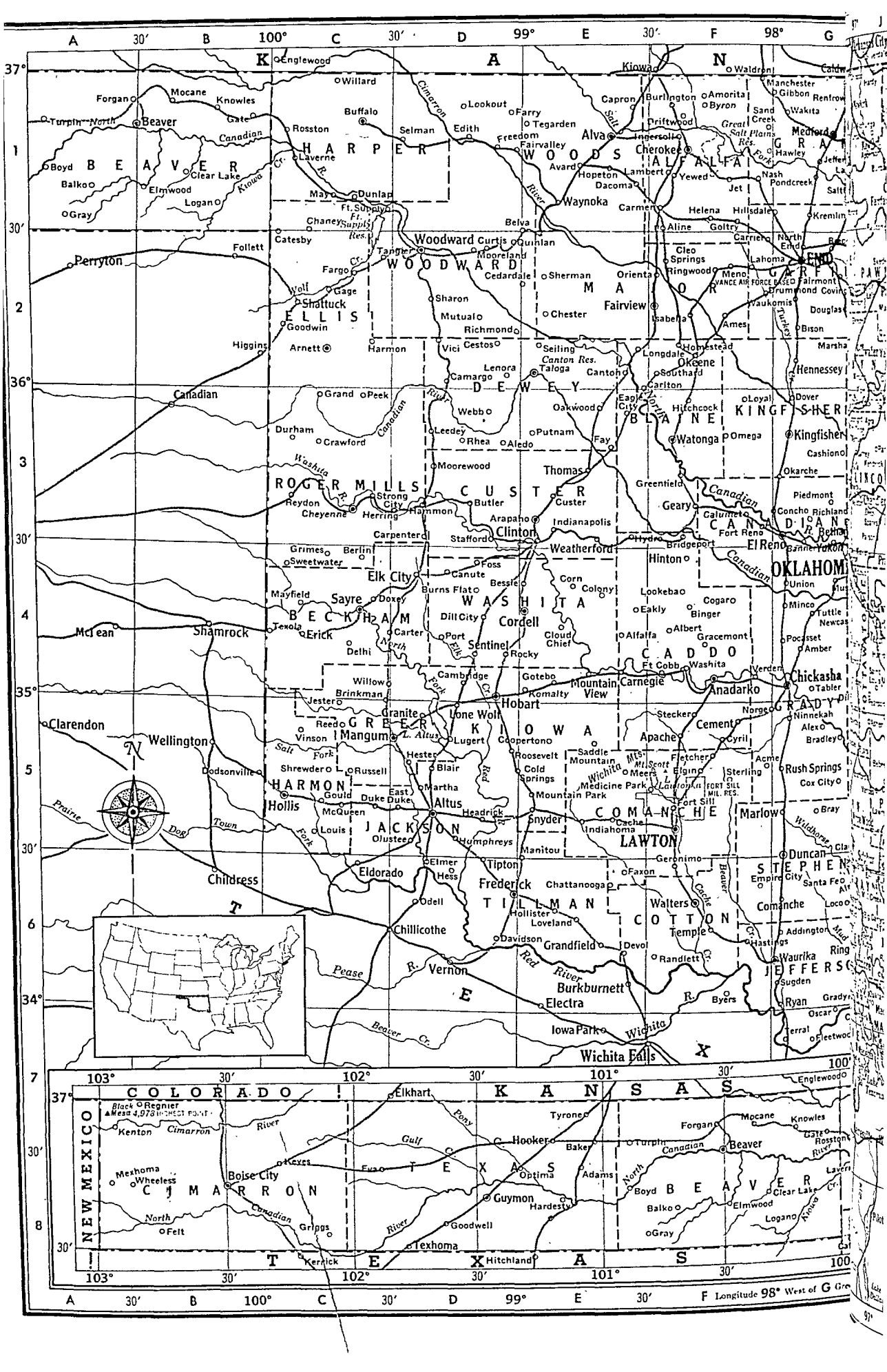
COUNTIES

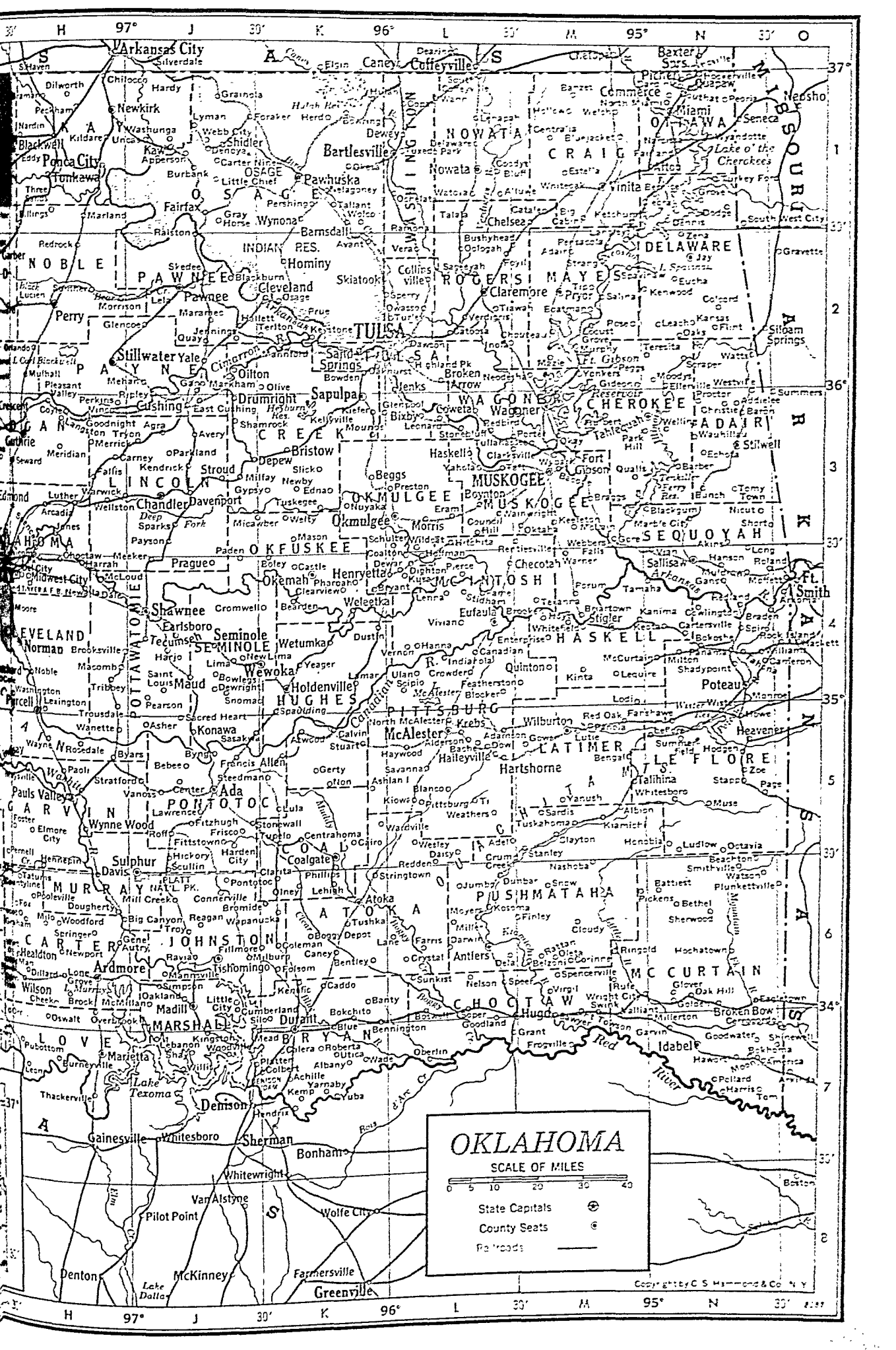
Adair	14,918	N 3
Alfalfa	10,699	F 1
Atoka	14,269	K 6
Beaver	7,411	F 8
Beckham	21,627	C 4
Blaine	15,049	F 3
Bryan	28,999	K 7
Caddo	34,913	F 4
Canadian	25,644	F 3
Carter	36,455	H 6
Cherokee	18,989	M 3
Choctaw	20,405	L 6
Cimarron	4,589	B 8
Cleveland	41,443	H 4
Coal	8,056	K 5
Comanche	55,165	F 5
Cotton	10,180	F 6
Craig	18,263	M 1
Creek	43,143	K 3
Custer	21,097	D 3
Delaware	14,734	N 2
Dewey	8,789	D 2
Ellis	7,326	C 2
Garfield	52,820	G 2
Garvin	29,500	H 5
Grady	34,872	G 5
Grant	10,461	G 1
Greer	11,749	C 5
Harmon	8,079	C 5
Harper	5,977	C 1
Haskell	13,313	M 4
Hughes	20,664	K 4
Jackson	20,082	D 5
Jefferson	11,122	G 6
Johnston	10,608	J 6
Kay	48,892	H 1
Kingfisher	12,860	G 3
Kiowa	18,926	E 5
Latimer	9,690	M 5
Le Flore	35,276	N 5
Lincoln	22,102	J 3
Logan	22,170	H 3
Love	7,721	H 7
Major	10,279	F 2
Marshall	8,177	J 6
Mayes	19,743	M 2
McClain	14,681	H 5
McCurtain	31,588	N 6
McIntosh	17,829	L 4
Murray	10,775	H 6
Muskogee	65,573	M 3
Noble	12,156	H 2
Nowata	12,734	L 1
Okfuskee	16,948	K 3
Oklahoma	325,352	H 3
Okmulgee	44,561	L 3
Osage	33,071	K 1
Ottawa	32,218	N 1
Pawnee	13,616	J 2
Payne	46,430	J 2
Pittsburg	41,031	L 5
Pontotoc	30,875	J 5
Pottawatomie	43,517	J 4
Pushmataha	12,001	M 6
Roger Mills	7,395	C 3
Rogers	19,532	L 2
Seminole	40,672	J 4
Sequoyah	19,773	N 3
Stephens	34,071	G 6
Texas	14,235	D 8
Tillman	17,598	E 6
Tulsa	251,686	L 2
Wagoner	16,741	L 3
Washington	32,880	L 1
Washita	17,657	E 4
Woods	14,526	E 1
Woodward	14,383	D 2

CITIES AND TOWNS

Achille	383	K 7
Acme	115	F 5
Ada	15,995	J 5
Adair	299	M 2
Adams	250	E 8
Adamson	200	L 5
Addielee		N 3
Addington	174	G 6
Adel	10	L 5
Afton	1,252	N 1
Agra	302	J 3
Akins		N 3
Albany	300	K 7
Albert	120	F 4
Albion	178	M 5
Alderson	311	L 5
Aledo		D 3
Alex	563	G 5
Alfalfa	170	E 4
Aline	385	F 1
Allen	1,215	K 5
Alluwe	200	M 1
Alma		G 6
Altus	9,735	D 5
Alva	6,505	E 1
Amber	300	G 4
America	65	N 7
Ames	263	F 2
Amorita	125	F 1
Anadarko	6,184	F 4
Antlers	2,506	L 6
Apache	1,190	F 5
Apperson	21	J 1
Arapaho	311	D 3
Arcadia	350	H 3
Ardmore	17,890	H 6
Arkoma	1,691	O 4
Arnett	690	C 2
Asher	420	J 5
Ashland	104	K 5
Atoka	2,653	K 6
Atwood	125	K 5
Avant	389	K 2
Avard	96	E 1
Avery	20	J 3
Bache	300	L 5
Bacone	250	M 3
Baker	100	E 7
Balko	50	A 1
Banner	135	G 4
Banty	50	K 6
Banzet	2	M 1
Barber	70	N 3
Barnsdall	1,708	K 1
Baron	75	N 3
Bartlesville	19,228	K 1
Battiest	150	N 6
Beachton	25	N 6
Bearden	250	K 4
Beaver	1,495	B 1
Bebee	100	J 5
Beggs	1,214	L 3
Belva	35	D 1
Belzoni	25	M 6
Bengal	200	M 5
Bennington	361	L 7
Bentley		K 6
Berlin	51	C 4
Bernice	91	N 1
Bessie	205	D 4
Bethany	5,705	G 3
Bethel	165	N 6
Big Cabin	210	M 1
Big Canyon	120	J 6
Billings	620	H 1
Binger	773	F 4
Bison	100	G 2
Bixby	1,517	L 3
Blackburn	135	J 2
Blackgum		N 3
Blackwell	9,199	H 1
Blair	700	D 5
Blanchard	1,311	G 4
Blanco	200	L 5
Blocker	105	L 4
Blue	240	K 7
Bluejacket	274	M 1
Boatman	115	M 2
Boggy Depot		K 6
Boise City	1,902	B 8
Bokchito	643	K 6
Bokhoma	150	N 7
Bokoshe	589	N 4
Boley	646	K 4
Boswell	875	L 6
Bowden	300	K 2
Bowlegs	365	J 4
Bowring	120	K 1
Boyd	50	A 1
Boynton	718	L 3
Braden	50	N 4
Bradley	248	G 5
Braggs	374	M 3
Braman	392	H 1
Bray	40	G 5
Breckinridge	67	G 2
Briartown	150	M 4
Bridgeport	199	F 3
Brinkman	102	C 4
Bristow	5,400	K 3
Britton		G 3
Brock	54	H 6
Broken Arrow	3,262	L 2
Broken Bow	1,838	N 7
Bromide	258	J 6
Brooken		M 4
Brooksville	175	H 4
Bryant	88	L 4
Buffalo	1,544	C 1
Bunch	150	N 3
Burbank	268	J 1
Burlington	181	F 1
Burneyville	300	H 7
Burns Flat	250	D 4
Bushyhead	42	L 2
Butler	351	D 3
Byars	284	J 5
Byng	50	J 5
Byron	131	F 1
Cache	677	E 5
Caddo	895	K 6
Cairo	25	K 5
Calera	643	K 7
Calumet	339	F 3
Calvin	557	K 5
Camargo	312	D 2
Cambridge	22	D 4
Cameron	209	O 4
Canadian	277	L 4
Caney	252	K 6
Canton	959	E 2
Canute	355	D 4
Capron	100	E 1
Cardin		N 1
Carlton	60	F 2
Carmen	654	E 1
Carnegie	1,719	E 4
Carney	227	J 3
Carpenter	32	D 3
Carrier	135	F 2
Carter	406	D 4
Carter Nine		J 1
Cartersville	100	N 4
Cashion	182	G 3
Castle	144	K 4
Catale	40	M 1
Catesby	27	C 2
Catoosa	438	L 2
Cedardale	19	D 2
Cement	1,076	F 5
Center	75	J 5
Centrahoma	154	K 5
Centralia	124	M 1
Cerrogordo	66	N 7
Cestos	100	D 2
Chandler	2,724	J 3
Chaney	11	C 1
Chattanooga	333	E 6
Checotah	2,638	M 4
Cheek	75	H 6
Chelsea	1,437	L 1
Cherokee	2,635	F 1
Chester	129	E 2
Cheyenne	1,133	C 3
Chickasha	15,842	G 4
Chilocco	775	H 1
Choctaw	355	H 4
Chouteau	658	M 2
Christie	35	N 3
Claremore	5,494	M 2
Clarita	200	K 6
Clarksville		L 3
Claud		G 5
Clayton	612	M 5
Clear Lake	30	B 1
Clearview		K 4
Clemscot	240	G 6
Cleo Springs	310	F 2
Cleora	60	N 1
Cleveland	2,464	K 2
Clinton	7,555	D 3
Cloud Chief	125	E 4
Cloudy	50	M 6
Coalgate	1,984	K 5
Coalton	105	K 4
Cogar	67	F 4
Colbert	748	K 7
Colcord	205	N 2
Cold Springs		E 5
Cole	100	G 4
Coleman		K 6
Collinsville	2,011	L 2
Colony	400	E 4
Comanche	2,083	G 6
Commerce	2,442	M 1
Concho	250	G 3
Connerville		J 6
Coodys Bluff	116	L 1
Cookson		N 3
Cooperton	129	E 5
Copan	459	L 1
Cordell	2,920	E 4
Corinne	75	M 6
Corn	350	E 4
Cornish	152	G 6
Council Hill	166	L 3
Countyline	400	H 6
Courtney	150	G 7
Covington	769	G 2
Coweta	1,601	L 3
Cowlington	83	N 4
Cox City	250	G 5
Coyle	360	H 3
Crawford	49	C 3
Crescent	1,341	G 3
Cromwell	313	J 4
Crowder	267	L 4
Crum Creek	15	L 5
Crystal	70	L 6
Cumberland	200	J 6
Curtis	125	D 2
Cushing	8,414	J 3
Custer	479	E 3
Cyril	998	F 5
Dacoma	256	E 1
Daisy	30	L 5
Dale	205	H 4
Darwin	50	L 6
Davenport	841	J 3
Davidson	490	E 6
Davis	1,928	H 5
Dawson		L 2
Deer Creek	209	G 1
Del City	2,504	H 4
Dela	20	L 6
Delaware	582	L 1
Delhi		C 4
Dennis	48	N 1
Denoya	25	J 1
Depew	719	K 3
Devol	152	E 6
Dewar	1,015	L 4
Dewey	2,513	L 1
Dewright		J 4
Dibble	148	G 4
Dighton	17	L 4
Dill City	453	D 4
Dillard	155	H 6
Dilworth	63	H 1
Dodge	12	N 1
Dougherty	341	H 6
Douglas	114	G 2
Douthat	700	N 1
Dover	400	G 3
Dow	300	L 5
Doxey	75	C 4
Driftwood	69	F 1
Drummond	314	G 2
Drumright	5,028	K 3
Duke	331	C 5
Dunbar	85	L 6
Duncan	15,325	G 5
Dunlap		C 1
Durant	10,541	K 6
Durham	84	C 3
Dustin	524	K 4
Eagle City	106	E 3
Eagletown	600	N 6
Eakly	191	E 4
Earlsboro	278	J 4
East Cushing	450	J 3
East Duke	325	D 5
Echota	157	N 3
Eddy	10	H 1
Edith		D 1
Edmond	6,086	G 3
Edna	25	K 3
El Reno	10,991	F 3
Eldorado	732	C 6
Elgin	428	F 5
Elk City	7,962	D 4
Ellerville	36	N 2
Elmer	145	D 6
Elmore City	743	H 5
Elmwood	15	B 1
Empire City		G 6
Enid	36,017	G 2
Enterprise	200	M 4
Eram	39	L 3
Erick	1,579	C 4
Estella	10	M 1
Eucha		N 2
Eufaula	2,540	L 4
Eva	24	C 8
Fairfax	2,017	J 1
Fairland	699	N 1
Fairmont	134	G 2
Fairvalley		E 1
Fairview	2,411	E 2
Fallis	105	H 3
Fame	132	L 4
Fanshawe	305	N 5
Fargo	318	C 2
Farris	130	L 6
Farry	22	E 1
Faxon	135	E 6
Fay	175	E 3
Featherston	75	L 4
Felt	53	B 8
Fillmore	100	J 6
Finley	250	M 6
Fittstown	350	J 5
Fitzhugh	200	J 5
Fleetwood	125	G 7
Fletcher	875	F 5
Flint		N 2
Folsom	16	K 6
Foraker	105	K 1
Forgan	410	A 1
Fort Cobb	665	F 4
Fort Gibson	1,496	M 3
Fort Reno	35	F 3
Fort Sill		F 5
Fort Supply	293	C 1
Fort Towson	713	M 7
Foss	210	D 4
Foster	175	H 5
Fox	438	H 6
Foyil	146	M 2
Francis	271	J 5
Frederick	5,467	D 6
Freedom	332	D 1
Frisco		J 5
Frogville		M 7
Gage	648	C 2
Gano	4	J 2
Gans	300	N 4
Garber	957	H 2
Garden City	763	*L 2
Garvin	155	N 7
Gate	197	B 1
Geary	1,614	F 3
Gene Autry	170	J 6
Geronimo	103	F 6
Gerty	155	K 5
Gibbon	14	G 1
Gideon	100	M 2
Glencoe	309	H 2
Glenpool	280	L 3
Glover	89	N 6
Golden	150	N 6
Goltry	277	F 1
Goodland		L 7
Goodnight	18	H 3
Goodwater	25	N 7
Goodwell	714	D 8
Goodwin		C 2
Gore	387	M 3
Gotebo	574	E 4
Gould	303	C 5
Gowen	525	M 5
Gracemont	301	F 4
Grady	75	G 6
Graham	128	H 6
Grainola	79	J 1
Grand	3	C 3
Grandfield	1,232	E 6
Granite	1,096	D 5
Grant	351	M 7
Gray	25	A 1
Gray Horse	70	J 1
Greenfield	191	F 3
Griggs	10	C 8
Grimes	50	C 4
Grove	928	N 1
Guthrie	10,113	H 3
Guymon	4,718	D 8
Gypsy	53	J 3
Haileyville	1,107	L 5
Hallett	120	K 2
Hammon	621	D 3
Hanna	325	L 4
Hanson		N 4
Harden City	200	J 5
Hardesty	201	E 8
Hardy	17	J 1
Harjo	112	J 4
Harmon	20	C 2
Harrah	741	H 4
Harris	192	N 7
Hartshorne	2,330	M 5
Haskell	1,676	L 3
Hastings	285	F 6
Hawley		G 1
Haworth	254	N 7
Hayward	40	G 2
Haywood	200	L 5
Headrick	144	D 5
Healdton	2,578	H 6
Heavener	2,103	N 5
Helena	484	F 1
Hendrix	152	K 7
Hennepin	300	H 5
Hennessey	1,264	G 2
Henryetta	7,987	K 4
Herd	26	K 1
Herring	25	C 3
Hess		D 6
Hester	31	D 5
Hickory	112	J 5
Highland Park	476	L 2
Hillsdale	104	F 1
Hinton	1,025	F 4
Hitchcock	166	F 3
Hitchita	141	L 3
Hobart	5,380	E 5
Hochatown	180	N 6
Hockerville		N 1
Hodgen	100	N 5
Hoffman	302	L 4
Holdenville	6,192	K 4
Hollis	3,089	C 5
Hollister	172	E 6
Hollow	1	M 1
Homestead	95	F 2
Hominy	2,702	K 2
Honobia	100	M 5
Hooker	1,842	E 7
Hopeton	60	E 1
Howe	486	N 5
Hoyt		M 4
Hugo	5,984	M 6
Hulah		K 1
Hulbert	800	M 3
Humphreys		D 5
Hunter	279	G 1
Hydro	714	F 3
Idabel	4,671	N 7
Indiahoma	319	E 5
Indianapolis	10	E 3
Indianola	314	L 4
Ingersoll	78	F 1
Inola	294	L 2
Isabella		F 2
Jay	697	N 2
Jefferson	179	G 1

*No room on map for name


A 30′ B 100° C 30′ D 99° E 30′ F 98° G
37°
30′
36°
35°
34°
1
2
3
4
5
6
7
8
KANSAS
OKLAHOMA
TEXAS
NEW MEXICO
COLORADO
BEAVER
HARPER
WOODS
ALFALFA
GRANT
WOODWARD
MAJOR
GARFIELD
ELLIS
DEWEY
BLAINE
KINGFISHER
ROGER MILLS
CUSTER
CANADIAN
OKLAHOMA
BECKHAM
WASHITA
CADDO
GREER
KIOWA
HARMON
JACKSON
COMANCHE
TILLMAN
COTTON
GRADY
STEPHENS
JEFFERSON
CIMARRON
TEXAS
Englewood
Willard
Kiowa
Waldron
Forgan
Mocane
Knowles
Turpin North
Beaver
Gate
Buffalo
Rosston
Selman
Edith
Lookout
Farry
Tegarden
Freedom
Fairvalley
Capron
Burlington
Amorita
Byron
Driftwood
Great Salt Plains Res.
Medford
Alva
Ingersoll
Cherokee
Avard
Hopeton
Lambert
Yewed
Nash
Pondcreek
Jet
Hawley
Jeffer
Boyd
Clear Lake
Balko
Elmwood
Logan
Gray
Laverne
Canadian R.
Cimarron R.
Kiowa Cr.
May
Dunlap
Ft. Supply
Chaney
Ft. Supply Res.
Belva
Waynoka
Carmen
Helena
Hillsdale
Kremlin
Aline
Goltry
Carrier
North End
Perryton
Follett
Catesby
Tangier
Woodward
Curtis
Quinlan
Mooreland
Cleo Springs
Ringwood
Lahoma
Meno
Vance AFB
Air Force Based
Fairmont
Drummond
Covington
Waukomis
Douglas
Fargo
Cedardale
Sherman
Orienta
Fairview
Isabella
Ames
Bison
Marshall
Wolf
Gage
Shattuck
Sharon
Mutual
Chester
Goodwin
Richmond
Higgins
Arnett
Harmon
Vici
Cestos
Seiling
Canton Res.
Longdale
Homestead
Okeene
Hennessey
Lenora
Taloga
Camargo
Canton
Southard
Carlton
Canadian
Grand
Peek
Webb
Oakwood
Eagle City
Hitchcock
Loyal
Dover
Durham
Crawford
Leedey
Rhea
Aledo
Putnam
Fay
Watonga
Omega
Kingfisher
Cashion
Okarche
Washita R.
Moorewood
Thomas
Greenfield
Geary
Piedmont
Reydon
Cheyenne
Strong City
Herring
Hammon
Butler
Custer
Arapaho
Indianapolis
Clinton
Calumet
Concho
Richland
Carpenter
Stafford
Fort Reno
El Reno
Grimes
Berlin
Sweetwater
Weatherford
Hydro
Bridgeport
Canadian R.
Hinton
Elk City
Foss
Canute
Bessie
Burns Flat
Corn
Colony
Lookeba
Cogaro
Binger
Eakly
Union
Minco
Tuttle
Newcastle
Mayfield
Sayre
Doxey
Dill City
Cordell
Texola
Erick
Carter
Port
Sentinel
Rocky
Cloud Chief
Alfalfa
Albert
Gracemont
Pocasset
Amber
McLean
Shamrock
Delhi
North Fork Elk
Willow
Cambridge
Gotebo
Mountain View
Carnegie
Ft. Cobb
Washita
Verden
Chickasha
Tabler
Brinkman
Jester
Fork Cr.
Komalty
Anadarko
Hobart
Granite
Lone Wolf
Steckerd
Norge
Ninnekah
Alex
Clarendon
Reedo
Vinson
Mangum
L. Altus
Lugert
Cooperton
Roosevelt
Apache
Cyril
Bradley
Wellington
Salt Fork
Hester
Saddle Mountain
Fletcher
Acme
Dodsonville
Shrewder
Russell
Blair
Cold Springs
Meers
Elgin
Sterling
Rush Springs
Cox City
Harmon
Gould
East Duke
Martha
Red
Medicine Park
Mountain Park
Fort Sill
Fort Sill Mil. Res.
Hollis
McQueen
Duke
Altus
Headrick
Snyder
Cache
Indianola
Marlow
Bray
Prairie Dog Town Fork
Louis
Olustee
Humphreys
Manitou
Lawton
Wildhorse
Duncan
Childress
Elmer
Hess
Tipton
Eldorado
Frederick
Chattanooga
Faxon
Geronimo
Empire City
Santa Fe
Odell
Hollister
Loveland
Walters
Comanche
Chillicothe
Davidson
Grandfield
Devol
Temple
Addington
Hastings
Mud Cr.
Beaver R.
Cache Cr.
Pease R.
Vernon
Red River
Randlett
Waurika
Ring
Burkburnett
Electra
Byers
Sugden
Ryan
Grady
Oscar
Iowa Park
Wichita
Terral
Fleetwood
Wichita Falls
Elkhart
Tyrone
Pony
Black Mesa 4,978 HIGHEST POINT
Regnier
Kenton
Cimarron River
Gulf
Hooker
Bake
Forgan
Mocane
Knowles
Turpin
Canadian
Beaver
Rosston
Mexhoma
Wheeless
Boise City
Keyes
Eva
Optima
Adams
North Canadian River
Boyd
Clear Lake
Elmwood
Balko
Gray
Logan
Felt
Griggs
Goodwell
Guymon
Hardesty
Texhoma
Kerrick
Hitchland
103° 30′ 102° 30′ 101° 30′
F Longitude 98° West of G


OKLAHOMA
SCALE OF MILES
0 5 10 20 30 40
State Capitals
County Seats
Railroads
Arkansas City
Coffeyville
Bartlesville
Nowata
Pawhuska
Fairfax
Ponca City
Newkirk
Blackwell
Tonkawa
Perry
Stillwater
Cushing
Drumright
Sapulpa
Tulsa
Claremore
Pryor
Vinita
Miami
Commerce
Afton
Grove
Jay
Kansas
Siloam Springs
Cleveland
Pawnee
Skiatook
Collinsville
Sperry
Owasso
Tiawah
Catoosa
Verdigris
Inola
Chouteau
Locust Grove
Salina
Eucha
Kenwood
Colcord
Watts
Westville
Proctor
Summers
Gravette
Delaware
Jay
Eucha
Kenwood
Colcord
Watts
Westville
Proctor
Summers
Gravette
Bristow
Depew
Stroud
Chandler
Davenport
Wellston
Luther
Warwick
Arcadia
Jones
Deep Fork
Sparks
Paysono
Okmulgee
Morris
Council Hill
Oktaha
Muskogee
Boynton
Eram
Nuyaka
Beggs
Preston
Haskell
Checotah
Gibson
Fort Gibson
Webbers Falls
Braggs
Bunch
Tamy Town
Nicut
Marble City
Sherto
Akins
Sallisaw
Hanson
Roland
Long
Muldrow
Gans
Marrietta
Poteau
Monroe
Lodi
Wister
Howe
Heavener
Talihina
Stapp
Page
Zoe
Whitesboro
Muse
Albion
Kiamichi
Honobia
Ludlow
Octavia
Clayton
Stanley
Nashoba
Smithville
Watson
Beaston
Battiest
Plunkettville
Pickens
Bethel
Sherwood
Hochatown
Ringold
Idabel
Broken Bow
Goodwater
Shinewell
Bokhoma
Harris
Tom
Pollard
Arkinda
Millerton
Garvin
Swink
Valliant
Wright City
Glover
Oak Hill
Eagletown
Tuskahoma
Sardis
Haileyville
Hartshorne
Latimer
Le Flore
Mc Curtain
Choctaw
Hugo
Antlers
Atoka
Pushmataha
Coalgate
Stringtown
Phillips
Lehigh
Olney
Clarita
Redden
Daisy
Crumo
Creek
Wesley
Adelo
Ada
Pontotoc
Lula
Stonewall
Centrahoma
Tupelo
Cairo
Wardville
Kiowa
Pittsburg
Weathers
Blanco
Savannah
Ashland
Haywood
Aldersen
Bache
Dow
Lutie
Bengal
Field
Hodgen
Zoe
Page
Whitesboro
Muse
Albion
Kiamichi
Honobia
Ludlow
Octavia
Clayton
Stanley
Nashoba
Smithville
Watson
Beaston
Battiest
Plunkettville
Pickens
Bethel
Sherwood
Hochatown
Ringold
Idabel
Broken Bow
Goodwater
Shinewell
Bokhoma
Harris
Tom
Pollard
Arkinda
Millerton
Garvin
Swink
Valliant
Wright City
Glover
Oak Hill
Eagletown
Seminole
Wewoka
Holdenville
Konawa
Asher
Pearson
Sacred Heart
Spaulding
Francis
Allen
Steedmans
Gerty
Ada
Byars
Byng
Rosedale
Wynne Wood
Fitzhugh
Roff
Fittstown
Harden City
Sulphur
Davis
Hickory
Scullin
Platt Nat'l Pk.
Mill Creek
Connerville
Bromide
Wapanucka
Big Canyon
Reagan
Troy
Woodford
Dougherty
Springer
Gene Autry
Newport
Fillmore
Ravia
Milburn
Caney
Coleman
Boggy Depot
Tushka
Lane
Farris
Darwin
Millerton
Garvin
Swink
Valliant
Wright City
Glover
Oak Hill
Eagletown
Ardmore
Tishomingo
Mannsville
Simpson
Oakland
Madill
Kenefic
Caddo
Bokchito
Durant
Silo
Cumberland
Little City
Oswalt
Overbrook
Marshall
Love
Pottsbottom
Burneyville
Marietta
Lebanon
Kingston
Willis
Platter
Colbert
Albany
Achille
Yarnaby
Kemp
Yuba
Lake Texoma
Denison
Hendrix
Gainesville
Whitesboro
Sherman
Bonham
Whitewright
Van Alstyne
Pilot Point
Wolfe City
Denton
McKinney
Farmersville
Greenville
Lake Dallas
Bryan
Caddo
Banty
Bennington
Goodland
Grant
Frogville
Oberlin
Roberta
Utica
Wade
Calera
Blue
Boswell
Soper
Speer
Nelson
Sunkist
Crystal
Delaware
Belzoni
Rattan
Oleta
Corinne
Spencerville
Rufe
Virgil
Wright City
Swink
Valliant
Millerton
Garvin
Goodwater
Shinewell
Bokhoma
Harris
Tom
Pollard
Arkinda
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Jenks	1,037	L 2
Jennings	338	J 2
Jester	12	C 5
Jet	371	F 1
Jones	476	H 3
Jumbo	82	L 6
Kanima	65	N 4
Kansas		N 2
Kaw	561	J 1
Keefeton	135	M 3
Kellyville	528	K 3
Kemp	158	K 7
Kemp City (Hendrix)	152	K 7
Kendrick	172	J 3
Kenefic	115	K 6
Kenton		A 7
Kenwood	115	N 2
Keota	619	N 4
Ketchum	254	M 1
Keyes	431	C 8
Keystone	228	K 2
Kiamichi	100	M 5
Kiefer	275	K 3
Kildare	155	H 1
Kingfisher	3,345	G 3
Kingston	677	J 7
Kinta	283	M 4
Kiowa	802	L 5
Knowles	91	B 1
Komalty		E 4
Konawa	2,707	J 5
Kosoma	50	L 6
Krebs	1,532	L 5
Kremlin	143	G 1
Kusa		L 4
Lahoma	190	F 2
Lamar	180	K 4
Lambert	55	E 1
Lamont	594	G 1
Lane		K 6
Langley	204	M 2
Langston	685	H 3
Laverne	1,269	C 1
Lawrence	250	J 5
Lawton	34,757	F 5
Leach	200	N 2
Lebanon	200	J 7
Leedey	558	D 3
Leflore	400	N 5
Lehigh	352	K 6
Lela		J 2
Lenapah	328	L 1
Lenna		L 4
Lenora	33	D 2
Leon	122	H 7
Leonard	115	L 3
Lequire		M 4
Lexington	1,176	H 4
Lima	99	J 4
Lindsay	3,021	G 5
Little Chief	145	J 1
Little City	101	J 6
Loco	236	G 6
Locust Grove	730	M 2
Lodi	83	M 4
Logan	21	B 1
Lone Grove	285	H 6
Lone Wolf	660	D 5
Long	50	N 4
Longdale	277	F 2
Lookeba	206	F 4
Lookout		D 1
Louis		C 5
Loveland	96	E 6
Lovell	73	G 2
Loyal	125	F 3
Lucien	200	H 2
Ludlow	64	N 5
Lugert	68	D 5
Lula		K 5
Luther	409	H 3
Lutie	50	M 5
Lyman	75	J 1
Macomb	123	H 4
Madill	2,791	J 6
Manchester	190	G 1
Mangum	4,271	C 5
Manitou	293	E 5
Mannford	426	K 2
Mannsville	311	J 6
Maramec	184	J 2
Marble City	285	N 3
Marietta	1,875	H 7
Markham		J 2
Marland	221	H 1
Marlow	3,399	F 5
Marshall	386	G 2
Martha	222	D 5
Mason	130	K 3
Maud	1,389	J 4
May	143	C 1
Mayfield	51	C 4
Maysville	1,294	H 5
Mazie	70	M 2
McAlester	17,878	L 5
McCurtain	705	M 4
McLain	100	M 3
McLoud	718	H 4
McMan	28	H 6
McMillan	150	H 6
McQueen		C 5
Mead	200	K 7
Medford	1,305	G 1
Medicine Park	650	E 5
Meeker	672	J 4
Meers	38	E 5
Mehan	51	H 2
Meno	76	F 2
Meridian	187	H 3
Merrick	21	H 3
Mexhoma		A 8
Miami	11,801	N 1
Micawber	90	J 3
Midwest City	10,166	H 4
Milburn	350	K 6
Milfay	160	J 3
Mill Creek	299	J 6
Miller	32	L 6
Millerton	250	N 7
Milo	109	H 6
Milton	100	N 4
Minco	978	G 4
Mocane	7	B 1
Moffett	380	N 4
Monroe	200	N 4
Moodys	20	N 2
Moon	150	N 7
Moore	942	H 4
Mooreland	867	D 2
Moorewood	36	D 3
Morris	1,122	L 3
Morrison	297	H 2
Mounds	560	K 3
Mountain Pk.	418	E 5
Mountain View	1,009	E 4
Moyers	100	L 6
Muldrow	828	N 4
Mulhall	320	H 2
Murphy	66	M 2
Muse	150	N 5
Muskogee	37,289	M 3
Mustang	210	G 4
Mutual	130	D 2
Narcissa	100	N 1
Nardin	184	H 1
Nash	290	F 1
Nashoba	100	M 6
Navina	15	G 3
Nelagoney	138	K 1
Nelson	45	L 6
Neodesha		L 2
New Lima	52	K 4
New Marshall (Marshall)	386	G 2
New Woodville (Woodville)	78	J 7
Newalla	150	H 4
Newby	77	K 3
Newcastle	175	G 4
Newkirk	2,201	J 1
Newport	27	H 6
Nichols Hills	2,606	*H 3
Nicoma Park	1,200	H 4
Nicut	50	N 3
Ninnekah	250	G 5
Noble	724	H 4
Non	81	K 5
Norge	100	F 5
Norman	27,006	H 4
North Enid	219	G 2
N. McAlester		L 5
N. Miami	486	M 1
Nowata	3,965	L 1
Numa	12	G 1
Nuyaka	40	K 3
Oak Hill	35	N 6
Oakhurst	2800	L 2
Oakland	293	J 6
Oaks	70	N 2
Oakwood	161	E 3
Oberlin	80	L 7
Ochelata	357	L 1
Octavia	55	N 5
Oilton	1,109	J 2
Okarche	532	G 3
Okay	427	M 3
Okeene	1,170	F 2
Okemah	3,454	K 4
Okesa	25	K 1
OKLAHOMA CITY	243,504	H 4
Okmulgee	18,317	K 3
Oktaha	207	M 3
Oleta	50	M 6
Olive	165	K 2
Olney	75	K 6
Olustee	455	D 5
Omega		F 3
Oologah	242	L 2
Optima	97	E 8
Orienta	30	E 2
Orlando	262	H 2
Orr	70	H 6
Osage	425	K 2
Oscar	20	G 7
Oswalt	10	H 6
Overbrook	100	H 6
Owasso	431	L 2
Paden	426	J 3
Page	90	N 5
Panama	1,027	N 4
Panola	75	M 5
Paoli	353	H 5
Park Hill	150	M 3
Parkland	65	J 3
Pauls Valley	6,896	H 5
Pawhuska	5,331	K 1
Pawnee	2,861	J 2
Payson	80	J 3
Pearson	140	J 4
Peckham	125	H 1
Peek	3	C 3
Peggs	51	M 2
Pensacola	48	M 2
Peoria	201	N 1
Perkins	706	H 3
Pernell	250	H 5
Perry	5,137	H 2
Pershing	62	K 1
Pharoah	200	K 4
Phillips	181	K 6
Picher	3,951	N 1
Pickens		N 6
Piedmont	120	G 3
Pierce	200	L 4
Pittsburg	278	L 5
Platter	275	K 7
Pleasant Valley	16	H 3
Plunkettville	100	N 6
Pocasset	220	G 4
Pollard		N 7
Ponca City	20,180	H 1
Pondcreek	1,066	G 1
Pontotoc		J 6
Pooleville	150	H 6
Port	50	D 4
Porter	562	M 3
Porum	616	M 4
Poteau	4,776	N 4
Prague	1,546	J 4
Preston	525	L 3
Proctor	175	N 3
Prue	160	K 2
Pryor	4,486	M 2
Purcell	3,546	H 4
Putnam	106	E 3
Qualls	10	M 3
Quapaw	938	N 1
Quay	70	J 2
Quinlan	107	E 2
Quinton	951	M 4
Ralston	416	J 2
Ramona	583	L 1
Randlett	396	F 6
Rattan	200	M 6
Ravia	327	J 6
Reagan		J 6
Red Oak	568	M 5
Redbird	411	L 3
Redden	112	L 5
Redland	25	N 4
Redrock	253	H 2
Reed	200	C 5
Regnier		B 7
Renfrow	68	G 1
Rentiesville	156	M 4
Reydon	331	C 3
Rhea		D 3
Richland	50	G 3
Richmond	2	D 2
Ringling	1,092	G 6
Ringold	106	M 6
Ringwood	331	F 2
Ripley	292	J 2
Roberta	65	K 7
Rock Island	110	O 4
Rocky	366	E 4
Roff	623	J 5
Roland	443	N 4
Roosevelt	679	E 5
Rose	100	M 2
Rosedale	136	H 5
Rosston	85	C 1
Roxana	25	G 2
Rubottom		H 7
Rufe	125	M 6
Rush Springs	1,402	G 5
Russell	63	C 5
Ryan	1,019	G 6
Sacred Heart	30	J 5
Saddle Mountain	2	E 5
Sageeyah	50	L 2
Saint Louis	290	J 4
Salina	905	M 2
Sallisaw	2,885	N 4
Saltfork	50	G 1
Sand Creek	38	F 1
Sand Springs	6,994	K 2
Santa Fe	8	G 6
Sapulpa	13,031	K 3
Sardis	85	M 5
Sasakwa	365	J 5
Savanna	900	L 5
Sawyer	200	M 7
Sayre	3,362	C 4
Schulter	700	L 3
Scipio	250	L 4
Scraper	50	N 2
Scullin	21	J 5
Seiling	700	E 2
Selman	58	D 1
Seminole	11,863	J 4
Sentinel	1,131	D 4
Seward	75	H 3
Shadypoint	315	N 4
Shamrock	263	K 3
Sharon	133	D 2
Shattuck	1,692	C 2
Shawnee	22,948	J 4
Shay	75	J 7
Sherman		E 2
Sherwood		N 6
Shidler	840	J 1
Shinewell		O 7
Short		N 3
Shrewder		C 5
Silo	75	J 6
Simpson	150	J 6
Skedee	170	J 2
Skiatook	1,734	K 2
Slick	151	K 3
Smithville	256	N 6
Snomac	55	J 4
Snow	100	M 6
Snyder	1,646	E 5
Soper	337	L 6
S. Coffeyville	527	L 1
Southard	452	F 2
Sparks	233	J 3
Spaulding	75	K 4
Spavinaw	213	M 2
Speer		M 6
Spencer	300	H 3
Spencerville	100	M 6
Sperry	665	L 2
Spiro	1,365	N 4
Springer	325	H 6
Stafford	60	D 3
Stanley	50	M 5
Stapp		N 5
Stecker	60	F 5
Steedman	75	J 5
Sterling	447	F 5
Stidham	46	L 4
Stigler	2,125	M 4
Stillwater	20,238	J 2
Stilwell	1,813	N 3
Stonebluff	300	L 3
Stonewall	634	K 5
Strang	201	M 2
Stratford	1,065	H 5
Stringtown	499	L 6
Strong City	107	C 3
Stroud	2,450	J 3
Stuart	303	K 5
Sugden	105	G 6
Sulphur	4,389	J 5
Summerfield	300	N 5
Sumner	46	H 2
Sunkist		L 6
Sweetwater	60	C 4
Swink	96	M 6
Tabler		G 4
Taft	541	M 3
Tahlequah	4,750	M 3
Tahona	45	N 4
Talala	210	L 1
Talihina	965	N 5
Tallant	130	K 1
Taloga	430	E 2
Tamaha	117	N 4
Tangier	25	C 2
Tatums	210	H 6
Tecumseh	2,275	J 4
Tegarden	14	E 1
Temple	1,442	F 6
Teresita	50	N 2
Terlton	122	K 2
Terral	616	G 7
Texanna	25	M 4
Texhoma	1,464	D 8
Texola	265	C 4
Thackerville	178	H 7
Thomas	1,171	E 3
Three Sands	50	H 1
Ti	23	L 5
Tiawah	100	L 2
Tip	25	M 2
Tipton	1,172	D 6
Tishomingo	2,325	J 6
Tom		N 7
Tomy Town	75	N 3
Tonkawa	3,643	H 1
Tribbey	100	H 4
Trousdale	50	H 4
Troy		J 6
Tryon	285	J 3
Tullahassee	209	L 3
Tulsa	182,740	K 2
Tupelo	376	K 5
Turkey Ford	100	N 1
Turley		L 2
Turpin		A 1
Tushka		K 6
Tuskahoma	325	M 5
Tuskegee	84	K 3
Tussy	96	G 6
Tuttle	715	G 4
Tuxedo Park	1,179	L 1
Tyrone	261	E 7
Ulan	30	L 4
Uncas	100	H 1
Union	301	G 4
Utica	100	K 7
Valliant	661	M 6
Vanoss	118	J 5
Velma	1,034	G 6
Vera	164	L 2
Verden	508	F 4
Verdigris	150	L 2
Vernon	450	L 4
Veterans Village	3,355	*H 2
Vian	927	N 4
Vici	620	D 2
Vinco	25	H 3
Vinita	5,518	M 1
Vinson	125	C 5
Virgil	55	M 6
Vivian	75	L 4
Wade	150	K 7
Wagoner	4,395	M 3
Wainwright	138	M 3
Wakita	440	G 1
Walters	2,743	F 6
Wanette	594	H 5
Wann	99	L 1
Wapanucka	592	J 6
Wardville	89	L 5
Warner	382	M 4
Warr Acres	2,378	G 3
Warwick	132	H 3
Washington	292	H 4
Washita	45	F 4
Washunga	91	J 1
Watonga	3,249	F 3
Watova	250	L 1
Watson	100	N 6
Watts	267	N 2
Wauhillau	48	N 3
Waukomis	537	F 2
Waurika	2,327	G 6
Wayne	501	H 5
Waynoka	2,018	E 1
Weatherford	3,529	E 4
Weathers	200	L 5
Webb	33	D 3
Webb City	284	J 1
Webbers Falls	489	M 3
Welch	483	M 1
Weleetka	1,548	K 4
Welling	77	N 3
Wellston	643	H 3
Welty	50	K 3
Wesley	35	L 5
Westville	781	N 2
Wetumka	2,025	K 4
Wewoka	6,747	K 4
Wheatland	300	G 4
Wheeless	15	B 8
Whitefield	350	M 4
Whiteoak	100	M 1
Whitesboro		N 5
Wilburton	1,939	M 5
Wildcat	147	L 3
Willard		O 1
Williams	200	O 4
Willis	115	J 7
Willow	223	C 4
Wilson	1,832	H 6
Wirt	700	G 6
Wister	729	N 5
Wolco	100	K 1
Woodford	105	H 6
Woodville	78	J 7
Woodward	5,915	D 2
Wright City	1,121	M 6
Wyandotte	242	N 1
Wybark	50	M 3
Wynne Wood	2,423	H 5
Wynona	678	K 1
Yahola	65	L 3
Yale	1,359	J 2
Yanush	156	M 5
Yarnaby	200	K 7
Yeager	180	K 4
Yewed	100	F 1
Yonkers	20	M 2
Yuba	108	K 7
Yukon	1,990	G 3
Zena	25	N 2
Zincville		N 1
Zoe	80	N 5

*No room on map for name.

gasoline for fuel and oil for lubrication. Within a relatively few years the demand for petroleum products grew enormously. Petroleum production soon became one of Oklahoma's most important industries.

The Lay of the Land

Oklahoma is a part of the great Mississippi basin. As is indicated by the eastward-flowing Arkansas and Red rivers, the surface is in general a gradual slope to the southeast. The western end of the state's long "panhandle" lies in the Great Plains where the altitude is almost 5,000 feet. The valley of the Red River slopes to as low as 300 feet above sea level in the southeastern corner, at the Arkansas boundary.

The state's long slope is often broken by hilly regions. In the northeast the Ozark Plateau extends over from Arkansas. The Ouachitas, in the southeast, form parallel ridges covered with forests of pine, hickory, oak, and other hardwoods. Part of this area is included in the Ouachita National Forest. The Arbuckle Mountains, in the south-central section, rise only 700 feet above the plains. In this region is Platt National Park, noted for its medicinal springs (*see* National Parks). The Wichitas in the southwest are the tops of an ancient range. Here is the Wichita Mountains Wildlife Refuge, a federal game preserve with herds of wild animals.

Farm Products

About one fifth of Oklahoma's gainfully employed people are engaged in agriculture, which is the state's leading industry. Winter wheat, cotton, corn, and sorghum are the most valuable cash crops. Other important field crops are hay, oats, and peanuts.

Soil and average annual rainfall vary greatly in different sections of Oklahoma. The Panhandle plateau has fertile land but it has less rainfall than other parts of the state. Sorghum and broom corn are most successful here. East of the Panhandle is a wheat-growing area. Cotton is a specialty in the southwest. The central section of the state is suited to diversified farming. Corn and oats are grown extensively in the east. Fruit, pecans, and vegetables thrive in the rich eastern valleys. Cattle, hogs, and chickens are raised throughout the state. Milk and eggs are also important sources of farm income. In average years, Oklahoma's farm income far exceeds its income from manufacturing.

Mining and Manufacturing

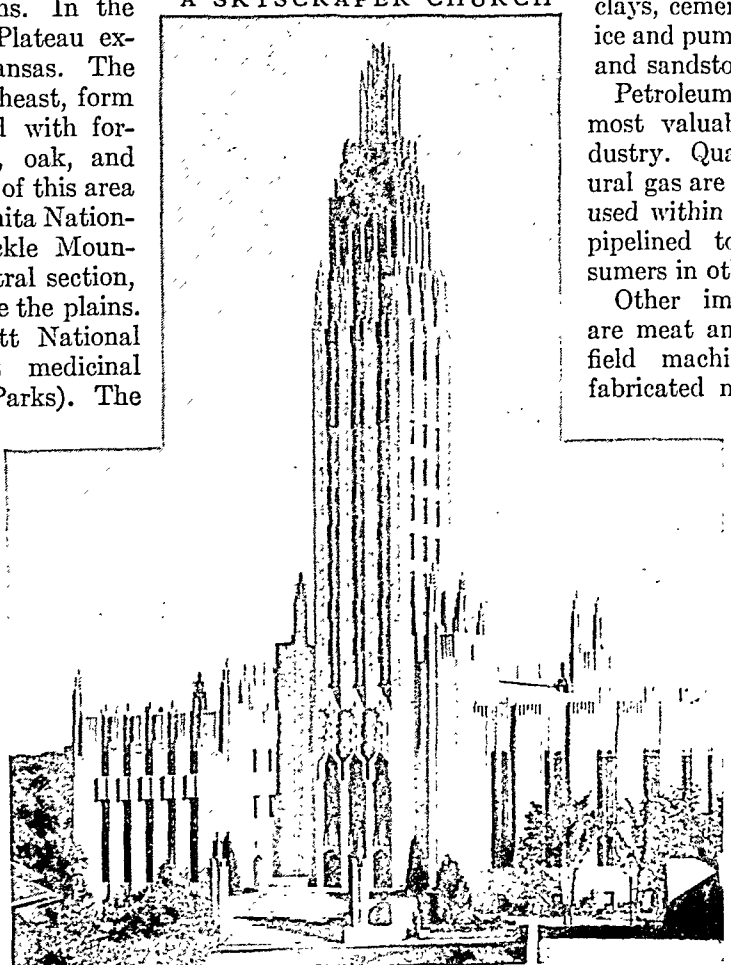
Today Oklahoma ranks high among the states of the Union in petroleum production. Within a 60-mile radius of Oklahoma City are more than 5,000 oil wells which yield more than half of the state's total production. This area and other large fields in the state also produce natural gas and natural-gas liquids.

Bituminous coal ranks high in importance. All Oklahoma's coal is mined in the east. Oklahoma is one of the leading states in producing zinc and lead. Stone, sand and gravel, native asphalt, clays, cement, gypsum, lime, pumice and pumicite, salt, ground sand, and sandstone are also mined.

Petroleum refining is the state's most valuable manufacturing industry. Quantities of oil and natural gas are not only processed and used within the state but also are pipelined to refineries and consumers in other states.

Other important manufactures are meat and grain products, oilfield machinery and tools, and fabricated metals. The manufacture of glass products, such as containers and flat glass, is another of Oklahoma's large industries.

A SKYSCRAPER CHURCH

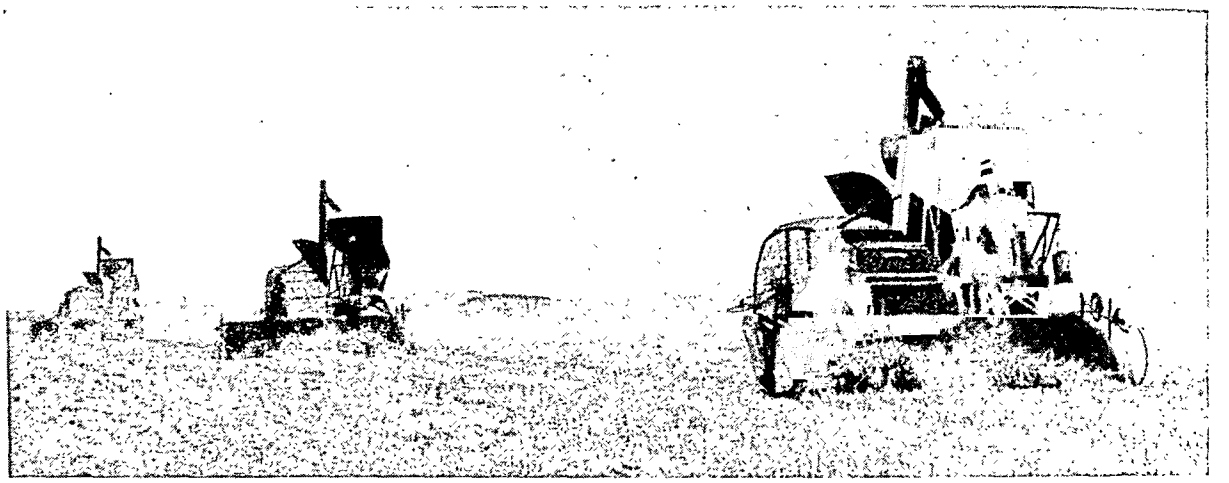


Only a few years ago Tulsa was a "cow town" and an Indian trading post. Now it has such architectural triumphs as the Boston Avenue Methodist Church, a striking example of the modernistic in ecclesiastical buildings.

Towns and Cities

The development of the petroleum industry in a few years transformed Oklahoma from a state of one-street villages to one with skyscraper cities. Tulsa is now one of the nation's biggest oil centers (*see* Tulsa). It is called the "millionaire city" because of the fortunes made in the oil fields. Oklahoma City, the capital, is the leading industrial and commercial center (*see* Oklahoma City). Turner Turnpike connects the two cities. Extensions of this toll road from Tulsa northeast toward Joplin, Mo., and from Oklahoma City southwest toward Wichita Falls, Tex., and north toward Wichita, Kan., were approved in 1954.

Muskogee, once a fur-trade center, now serves a large farm area. Enid is a market for wheat and purebred stock. Shawnee is an oil, flour-mill, and farm center. Lawton is a cotton and oil country. Ardmore, Ponca City, Bartlesville, and Okmulgee are among

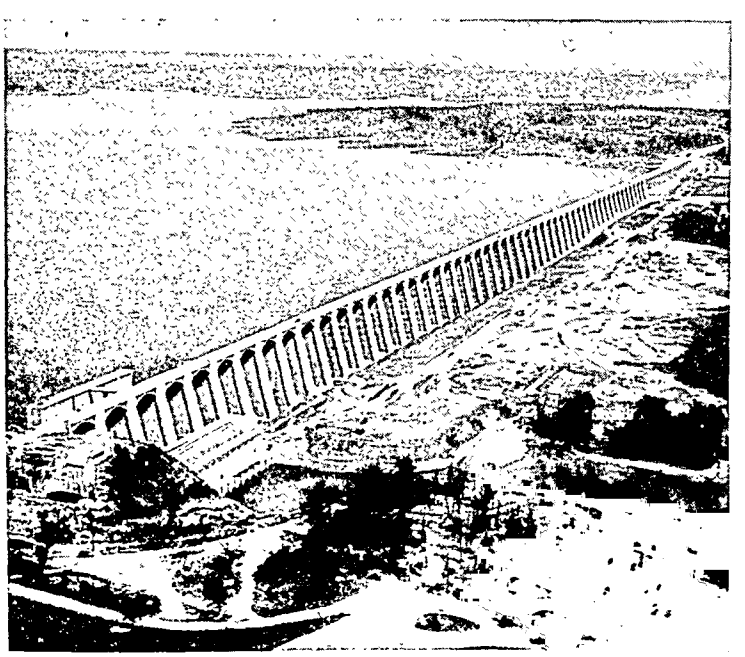


A gang of busy wheat combines raises a cloud of dust as it gathers the grain from the rich rolling prairies of Oklahoma. Wheat is the number one field crop of the Sooner State. Oklahoma is one of the top-ranking wheat-producing states in the country.





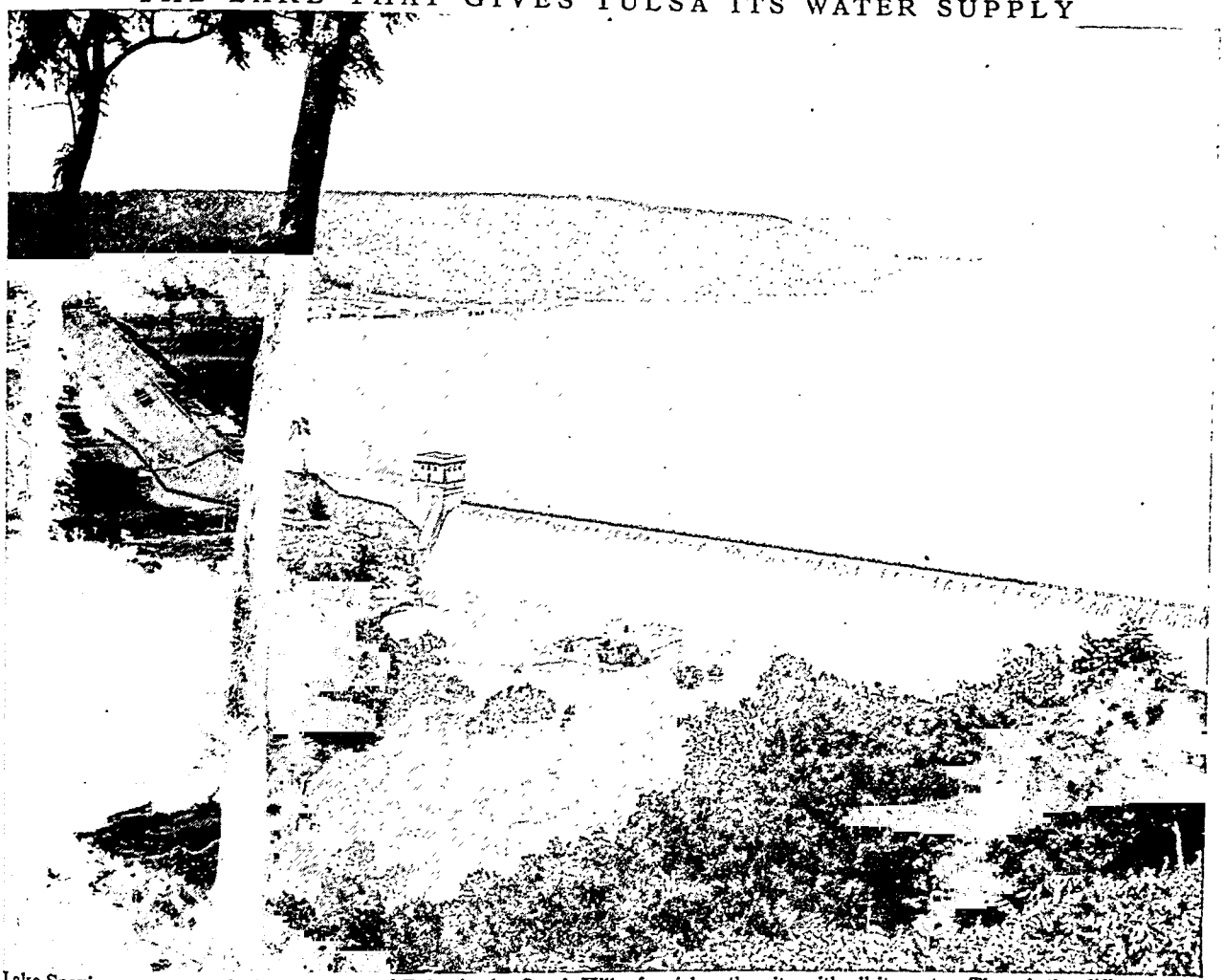
Against the impressive sky line at the left may be seen some of the oil refineries that have helped to earn for Tulsa the name "Oil Capital of the World." At the right is a cattle ranch characteristic of the southern and western parts of Oklahoma.





At left, Grand River Dam (also called Pensacola Dam) on the Grand (Neosho) River in northeastern Oklahoma impounds Lake o' the Cherokees for power and flood control. The Union Building of the University of Oklahoma (right) is at Norman.

THE LAKE THAT GIVES TULSA ITS WATER SUPPLY



Lake Spavinaw, a reservoir 55 miles east of Tulsa in the Ozark Hills, furnishes the city with all its water. Though the difference in elevation is only 90 feet, the water is brought the entire distance by the force of gravity alone. During the peak months 23 million gallons of water are consumed daily, with no appreciable drop in the lake level.

other cities that owe their rapid growth largely to the oil industry of Oklahoma. Norman and Stillwater are educational centers in agricultural and oil areas.

Provisions for Education

Within Oklahoma, appropriations for public educational institutions draw upon a $5,000,000 fund set up when the territory became a state and upon income from public lands.

Today Oklahoma has 12 state-supported colleges. These include the University of Oklahoma established in 1892 at Norman, an agricultural and mechanical college at Stillwater, six teachers colleges, and Langston University (Negro). Among other colleges for whites are Oklahoma City University, University of Tulsa, Oklahoma Baptist University at Shawnee, and Phillips University at Enid.

History of the State

In quest of the fabled riches of Quivira, the Spaniard Coronado in 1541 hurried through what is now Oklahoma. Here the Frenchman De la Harpe camped in 1719.

The Louisiana Purchase of 1803 embraced all Oklahoma except the long narrow strip in the northwest. This strip originally belonged to Texas. When Texas in 1850 sold to the United States territory now part of New Mexico, Colorado, Wyoming, and Kansas, it also included this Panhandle in Oklahoma north of parallel 36° 30′. Until 1890, when this strip was included in Oklahoma Territory, it was a part of the public domain, popularly called "No Man's Land."

Washington Irving hunted in this country in 1832 and wrote about it in his 'Tour of the Prairies': "In the oft-vaunted regions of the far West . . . there is to be seen neither the log house of the white man nor the wigwam of the Indian. . . . Over these fertile wastes still roam the elk, the buffalo, and the wild horse in all their native freedom. These are the hunting grounds of the tribes of the far West."

From Indian Territory to Statehood

In 1830 this region was recognized by Congress as part of the "unorganized or Indian territory." Here Indians from east of the Mississippi were to be settled. In anticipation of the removal of the Indians to these lands, Fort Gibson and Fort Towson had been built in 1824. The Five Civilized Tribes—the Cherokees, Choctaws, Chickasaws, Creeks, and Seminoles—were forced to move from Georgia, Alabama, Mississippi, and Florida to Oklahoma. Their tragic journey from 1828 to 1846 is known as the Trail of Tears.

Many Indians died from exposure, poor food, and disease. In their new home, the Indians prospered. Each tribe or nation governed itself by its own laws and courts. They improved their farms and built schools.

In 1828 Sequoyah, the great Cherokee, came to Oklahoma. He had invented the Cherokee alphabet in 1821 and now he taught it to his people. Within a few years the Cherokee nation became literate.

Many of the Indians owned slaves, and in the Civil War their sympathies were with the South. At the end of the war these "rebel" tribes were forced to free their slaves and to cede back to the United States much of their western territory. This land became the home of many tribes from the western plains north of what is now Oklahoma.

In the Wichita Mountains, Sheridan, Custer, and McClellan campaigned against the Wichitas, Comanches, and Kiowas in 1850-60. At Fort Sill near Lawton, the noted Apache chief Geronimo was held prisoner for years before his death in 1909.

After 1867, cattle were driven from the ranches of Texas through Indian Territory over the old Chisholm Trail to Abilene, Kan. From there they were shipped to Kansas City and Chicago. In the Indian Territory, "cattle kings" also leased grazing lands from the Indians. These cattlemen were hostile to the "boomers" who kept trying to set up crop farms in the country even though white settlement was forbidden.

President Hayes had to send troops to drive out illegal homesteaders led by Capt. David L. Payne, "the Cimarron scout." Old homesteaders returned and new ones came, all aided by the completion of the Santa Fe railroad across the territory in 1886-87.

Because the Federal government was unable to keep out white settlers, it finally purchased title to the land of the Creeks and Seminoles. In 1889 the government opened the area to white settlement, and 100,000 farm seekers rushed in to stake out claims In 1890 a territorial government was set up.

When statehood was first considered, the Five Civilized Tribes made efforts to form a separate state. However, in 1907 they finally joined with Oklahoma Territory to make the present state of Oklahoma. The capital was set up at Guthrie and later moved to Oklahoma City, its present site.

From the beginning, residents with Indian blood took a prominent place in the affairs of the state. They sat in the convention that drew up the state constitution in 1906. Since then, they have been elected to the state and the national legislatures.

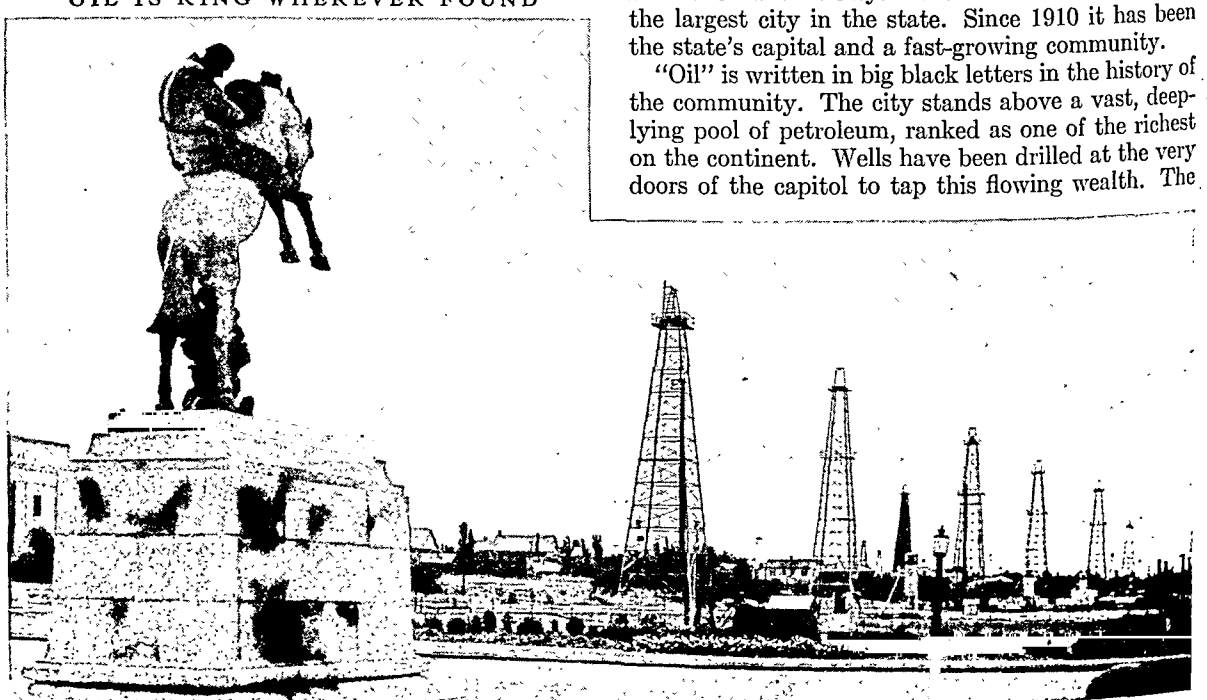
Discovery of petroleum on tribal lands made some Indians wealthy. A small number of full-blooded Indians occupy remote areas. Intermarriage with whites is common. The Indians number some 110,000, or about one third of all the Indians in the nation.

Oklahoma's constitution provides for the initiative and referendum. Although one of the youngest state constitutions, it has more than 40 amendments. Some of these provide for employers' liability for accidents, child-labor restrictions, regulation of public-service corporations, and a balanced budget. (*See also* chronology in Oklahoma Fact Summary; United States, sections "The South" and "Great Plains.")

OKLAHOMA CITY, OKLA. The first day that the Oklahoma country was thrown open to settlement, April 22, 1889, thousands of men poured into what is now Oklahoma City. In a few decades it became the largest city in the state. Since 1910 it has been the state's capital and a fast-growing community.

"Oil" is written in big black letters in the history of the community. The city stands above a vast, deep-lying pool of petroleum, ranked as one of the richest on the continent. Wells have been drilled at the very doors of the capitol to tap this flowing wealth. The

OIL IS KING WHEREVER FOUND



Oklahoma City is underlaid with petroleum deposits, and scenes such as this are common. Oil derricks stand in the parkway that leads south from the State Capitol. Overlooking them is a statue that commemorates the Pioneer Horseman of earlier days.

large oil and gas companies making their headquarters here have helped to finance construction of many of the city's big buildings.

West of the business district are stockyards, meat-packing plants, and many industrial plants that process products of the state's farms, ranches, mines, quarries, and wells. They include flour mills, cotton gins, cottonseed-oil plants, oil refineries, foundries, and factories making aircraft, furniture, tools, plastics, paper, and oil-well equipment. The Air Force's Tinker Field, to the southeast, is one of the world's largest air matériel and plane-repair depots. Oklahoma City serves as a wholesale distribution center for a wide area.

At the corners of the city lie four large parks connected by a circling boulevard. The use of gas as fuel by home owners and industry keeps Oklahoma City unusually clean. In the city are Oklahoma City University, Oklahoma City College of Law, and the medical school of the University of Oklahoma. The state fair and a livestock show are annual events.

In 1927 city-manager government was instituted. In the 1930's a six-block area was built up with government buildings and an auditorium. An express toll road between Tulsa and Oklahoma City was completed in 1953. Revenues from wells drilled on city-owned land make low tax rates possible. Population (1950 census), 243,504.

OKRA. The long, heavily ribbed pods of the perennial okra plant yield an important vegetable. The green pod contains a mucilage used to thicken soups and stews. In the southern United States okra soup is called "gumbo," and there the plant also is known by that name. The pods can be cooked like asparagus. Dried, they provide a nutritious winter dish. The plants grow from two to seven feet high. The lobed, heart-shaped leaves measure 12 inches across, and the yellow flower has a red center. Okra was native to the tropics of the Eastern Hemisphere but now is cultivated widely. In northern climates, because the seeds will not survive winter's moist cold, it must be newly planted each year. The scientific name of okra is *Hibiscus esculentus*. It belongs to the *Malvaceae* (mallow) family and is related to the hollyhock.

OKRA, OR GUMBO

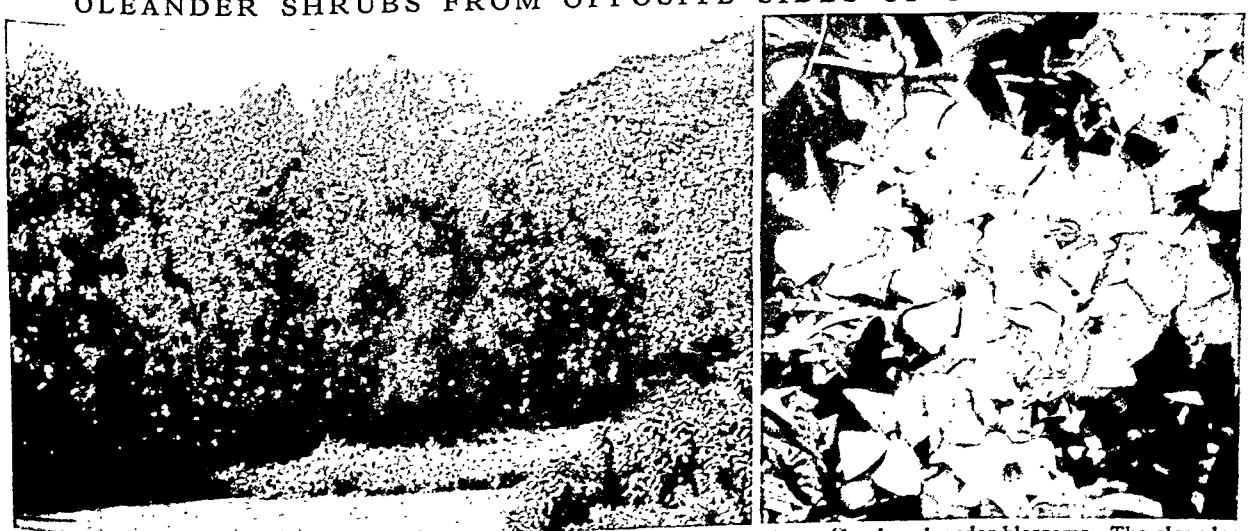


The okra pod contains a mucilage used to thicken soups and stews. The pods also are cooked and eaten as a vegetable.

OLEAN'DER. The flowers of the oleander make it one of the most beautiful of the evergreen shrubs. The sweet-scented oleander, the *Nerium indicum*, grows to a height of eight feet; and the *Nerium oleander*, to 20 feet. The oleander is native to the warm regions from the Mediterranean to Japan and has been naturalized in other warm climates. In colder places it is cultivated indoors in tubs. The flowers of the smaller oleander vary from rosy pink to white and are very fragrant. The larger species has white and yellow flowers. The blossoms of both are funnellike, and the leaves are shaped like a lance. A milky juice exuded by the leaves is an alkaloid poison and has been used in medicine as a heart stimulant. The poison can kill a person, and proper care should be taken when handling the leaves. The oleander is a member of the *Apocynaceae* (dogbane) family.

OLEOMAR'GARINE (*ō-lē-ō-mär'ĝä-rēn*). A butterlike spread made of animal or vegetable fats is called oleomargarine or margarine. A French chemist, Mège-Mouries, patented the process for making it just before the Franco-Prussian War to fill the French need for a butter substitute. His substitute could be made

OLEANDER SHRUBS FROM OPPOSITE SIDES OF THE WORLD



Hawaiian oleanders flaunt sweet-scented blooms (left). A close-up view (right) shows Algerian oleander blossoms. The oleander is popular the world over. It thrives in warm climates; in colder lands the oleander is grown indoors in great tubs.

THE OLIVE TREE PROVIDES FOOD AND A SYMBOL



A famous olive tree (left) rises near the Golden Gate of the Garden of Gethsemane in Jerusalem. It is centuries old and was growing at the time Christ suffered in the Garden. A California olive tree (right) spreads its branches widely. Through the centuries the olive has yielded an important food product and its branches have been symbols of peace, plenty, and victory.

to sell for less than butter. It had most of butter's food values and its use spread rapidly.

The first oleomargarine was made from beef fat. Later processes used other animal fats and vegetable oils. Today most margarine is made from vegetable oils, chiefly cottonseed oil. Other vegetable oils used are soybean, coconut, peanut, and corn oils.

By a chemical process called *hydrogenation*, all color and taste are removed and the oils hardened (*see* Hydrocarbons). Pasteurized skim milk, which has been ripened or soured with a whole milk culture, is added to give a butter flavor. Other ingredients are benzoate of soda and lecithin. The whole is fortified with vitamin A. The mixture is churned until emulsified, then chilled, the excess water removed, and salt added.

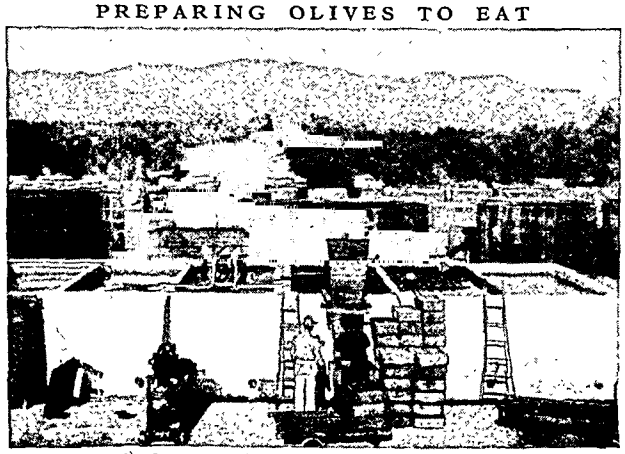
The food value of today's margarine is equal to butter, although the flavor of butter is preferred. On the other hand, margarine does not become rancid as quickly as butter. Margarine is increasingly used as a cooking fat and as a substitute for butter. In 1939 about 300 million pounds were sold in the United States; present-day sales exceed one billion pounds.

To protect their dairy industries, many countries imposed licensing and taxing restrictions on the manufacture and sale of margarine. For many years Canada forbade its sale. The United States imposed its first restrictions in 1886, and various states also restricted sale. The Federal government imposed a tax of ten cents on each pound of colored and one-fourth cent on each pound of uncolored margarine. This resulted in a larger sale of uncolored margarine. Coloring matter was added to each package, which the buyer could mix with the margarine. In 1950 the United States removed the tax and license restrictions against margarine, and many states eased or eliminated their restrictive laws.

Olive. The fruit of the evergreen olive tree is one of the world's important sources of fats. Pickled olives are table delicacies. Olive oil serves as salad dressing, as a spread in place of butter, and as a cooking fat. The oil also is used in making soap, as fuel, and for some industrial purposes.

The olive tree was native to Asia Minor. In ancient times its cultivation spread to North Africa and southern Europe. In Greece the olive became sacred to Athena, and the olive branch is still a symbol of peace and plenty (*see* Athena). The Greek winners in Olympic Games were crowned with wreaths of olive leaves (*see* Olympic Games). The Greeks and Romans cleansed themselves with olive oil.

PREPARING OLIVES TO EAT



The men in the foreground are washing olives in a bath of lye water. This removes the olive's bitter taste. After washing, the olives are pickled in the huge brine tanks in the background.

Today Spain is the world's largest grower of olives. Olives now are grown in South Africa, China, Peru, Chile, Central America, Mexico, Australia, and the United States.

California produces 99 per cent of the olives grown in the United States. Spanish priests brought the first olives to the San Diego Mission, and today the state has some 25,000 acres planted in olives. In California orchards the trees are spaced

from 25 to 40 feet apart and usually are irrigated. New trees are started from four- to five-inch long prunings. These are planted in sand under artificial heat. After they have rooted, the tiny trees are transferred to a nursery. There they grow for two or three years before being transplanted in an orchard. Seven more years pass before the trees bear olives. The trees mature in 25 to 30 years, and some live more than 1,000 years.

Olives are hand-picked, and in America they are separated by machines into sizes called *super colossal, colossal, jumbo, giant, mammoth, extra large, large, medium,* and *standard.* Both green and ripe olives are soaked in a lye solution to remove a bitter taste, then washed. They are soaked for several days in big brine (salt water) vats. Ripe olives are darkened in the bath by aerating the brine. Olives are packed in brine in jars and cans. Oil is pressed from the small fruits. More than half of California's annual yield is pressed for oil. The United States imports more olives and olive oil than it produces.

The olive tree grows to a height of about 25 feet. It has a gray bark and thick smooth leaves that are green above and white underneath. Olive wood is hard and finely grained, and cabinetmakers use it for ornament. The scientific name of the common olive tree is *Olea europaea;* it is a member of the *Oleaceae* family.

OLYMPIA, WASH. Although it is about 190 miles from the point where Puget Sound opens upon the Pacific Ocean, Olympia, the capital of the state of Washington, is a busy port. It lies on Budd Inlet, at the end of Puget Sound's southernmost arm, 45 airline miles southwest of Seattle. The Port of Olympia Terminal stretches for 2,000 feet along its harbor basin; the terminal has transit sheds, cranes, and a cold-storage plant.

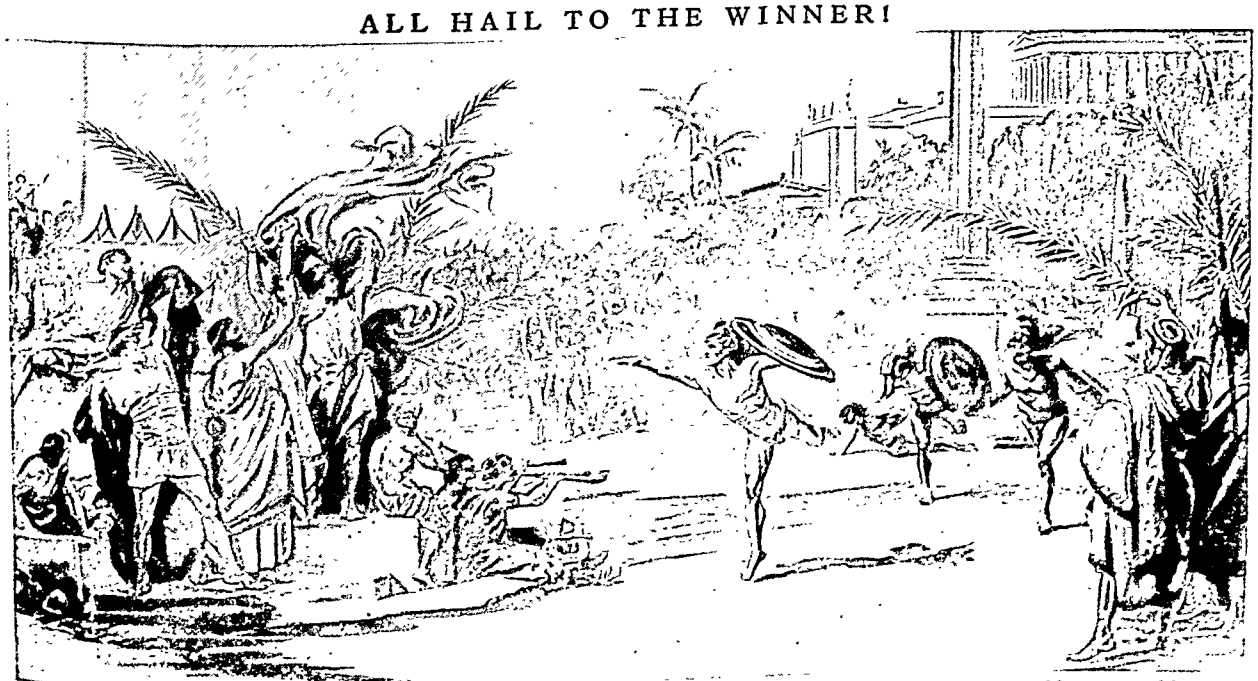
From the edge of the inlet, Olympia forms a semicircle on rising wooded hills. The Des Chutes River and Moxlie Creek cut it into three sections. In the southernmost of these, atop a broad knoll, is the state's impressive Capitol Group. From the knoll the Olympic Mountains to the north and Mount Rainier to the east can be seen. The Group, started in 1911 and completed in 1935, dominates the city. The Group has six white sandstone buildings, the highest of which is the Legislative Building (for picture, *see* Washington, State of). In the rear of the Group is the Governor's Mansion. The city has several parks within and near it. St. Martin's College, a Roman Catholic institution, is four miles east.

Government employees make up a large part of the city's workers. Others find employment in the wood industries (the city's production of plywood and veneer is one of the largest in the country) and in the fisheries. The small Olympia oysters are a celebrated delicacy.

The Olympia townsite was laid out by Edmund Sylvester in 1850. Known first as Smithter and then as Smithfield, it adopted its present name in 1851. It became capital of Washington Territory in 1853 and remained the capital when Washington became a state in 1889. It was incorporated with a population of 1,489 in 1859. Olympia has the commission form of government. Population (1950 census), 15,819.

OLYMPIC GAMES. Every four years the best amateur athletes in the world match skill and endurance in a series of contests called the Olympic Games. Almost every nation sends teams of selected athletes

ALL HAIL TO THE WINNER!



An artist here pictures the finish of the foot race, the last event of ancient Greece's Olympic Games. As the first runner reached the finish line, the great crowd which had already worked itself to a high stage of enthusiasm jumped to its feet and cheered wildly, the trumpeters blew great blasts on their instruments, and the air was filled with waving olive branches. For this event the running distance was usually twice the full length of the stadium.

TWO WINNERS AND A WINNER'S MEDAL







In 1952 at Oslo, Norway, Andrea Mead Lawrence (left) of Rutland, Vt., won the slalom and the giant slalom ski titles, the first woman to win two winter contests. Hjalmar Andersen (center) was the Norwegian hero, winning the 1,500-, 5,000-, and 10,000-meter ice-skating races. At the right is the gold medal awarded each winner in the 1952 summer games at Helsinki, Finland.

to take part. The purposes of the Olympic Games are to foster the ideal of a "sound mind in a sound body" and to promote friendship among nations.

The Olympic Games are named for athletic contests held in ancient Greece for more than 1,000 years. They were banned in A.D. 394 but in 1896 they were revived and made international. The regular Olympics are held in a large city in the summer. Winter sports, added to the Olympic program in 1924, are staged at a winter resort. The first and second World Wars prevented the Olympics in 1916, 1940, and 1944, but they were resumed in 1948.

Olympic Athletes Represent Many Lands

Through the years the modern Olympics have grown steadily in interest. In 1896 teams from 9 nations competed in 12 events. At the 1948 Olympics, 59 nations sent more than 5,000 athletes to take part in 134 events. In 1952 the XV Olympiad at Helsinki, Finland, drew a record number of 5,870 athletes representing 67 nations. They contested for 151 gold medals. Russia was among the nations competing for the first time.

Olympic Games emphasize individual achievement. There is no formal recognition of any nation as "winner" of these games; but unofficial team scores are kept by most newspapers. On the basis of these scores the United States made the most points in the regular Olympic contests from 1896 through 1932. Germany scored the highest total in 1936 but the United States "won" again in 1948. In 1952 the United States and Russia staged a close race for national honors. Russia led until the last day when the American athletes rallied to win.

In the winter Olympic Games the highest team totals were scored by the United States in 1924, 1928, and 1932; by Norway in 1936; by Sweden in 1948; and by Norway again in 1952.

The summer Olympics usually consist of boxing, canoeing, cycling, fencing, gymnastics, handball, horseback riding (equestrian), rowing, shooting (pistol and rifle), swimming, track and field events, weight lifting, wrestling, and yachting. Team sports include basketball, field hockey, polo, soccer, and water polo. The winter sports consist of speed and figure skating, skiing, bobsledding, and ice hockey. Curling was restored to the schedule for the 1952 games.

The most exacting track and field event is the *decathlon* (from the Greek words *deka* meaning "ten" and *cathlon*, "contest"). Contestants compete in ten different running, jumping, and throwing events. The athlete scoring the greatest total of points is the winner. The *pentathlon*, consisting of five such events, was discontinued after 1924. It was restored in the 1948 games as the *modern pentathlon*, based upon five military skills—fencing, riding, running, shooting, and swimming. The marathon race, covering 26 miles 385 yards, honors the ancient Greek runner Pheidippides (*see* Marathon). Women take part in separate track and field and swimming events.

Winners Are National Heroes

One of the most dramatic feats of the modern Olympics was the triumph of the United States team in 1896. Competing only as unofficial representatives of their nation, a ten-man squad hurried to Athens barely in time to participate. The Americans then startled the world by winning 9 out of 12 events.

In 1912 Jim Thorpe, an American-Indian athlete, became the only man to win both the decathlon and pentathlon in one year. Olympic officials later canceled his record when they learned that he had previously played professional baseball. In 1936 Jesse Owens, American Negro, gained fame by winning three individual events. In 1948 Fanny Blankers-Koen, of the Netherlands, mother of two children, became the first woman to win three championships.

Dick Button of the United States won the figure skating championship in 1948 and 1952. In 1952 Victor Tchoukarine, a triple winner, led the Russian athletes in dominating the gymnastics. Czechoslovakia's husband-and-wife team, Emil and Ingrova Zatopek, captured a total of four gold medals in the track and field events.

THREE CHAMPIONS IN THE XV OLYMPIAD



A star athlete in the 1952 games was Emil Zatopek (left,) a tireless runner from Czechoslovakia. He won the 5,000- and 10,000-meter races and the marathon. In the women's swimming events, Patricia McCormick of Long Beach, Calif. (center), won both the springboard- and high-diving contests. The women's discus throw was won by husky Nina Romaschkova of Russia (right).

The host cities for modern Olympic Games (with the location of the winter sports in parentheses), have been: 1896, Athens; 1900, Paris; 1904, St. Louis; 1906, Athens; 1908, London; 1912, Stockholm; 1920, Antwerp; 1924, Paris (Chamonix, France); 1928, Amsterdam (St. Moritz, Switzerland); 1932, Los Angeles (Lake Placid, N. Y.); 1936, Berlin (Garmisch-Partenkirchen, Germany); 1948, London (St. Moritz); 1952, Helsinki (Oslo, Norway). The International Olympic Committee chose Melbourne, Australia, for the 1956 summer games and Cortina, Italy, for winter sports.

Ancient Olympics Dedicated to Zeus

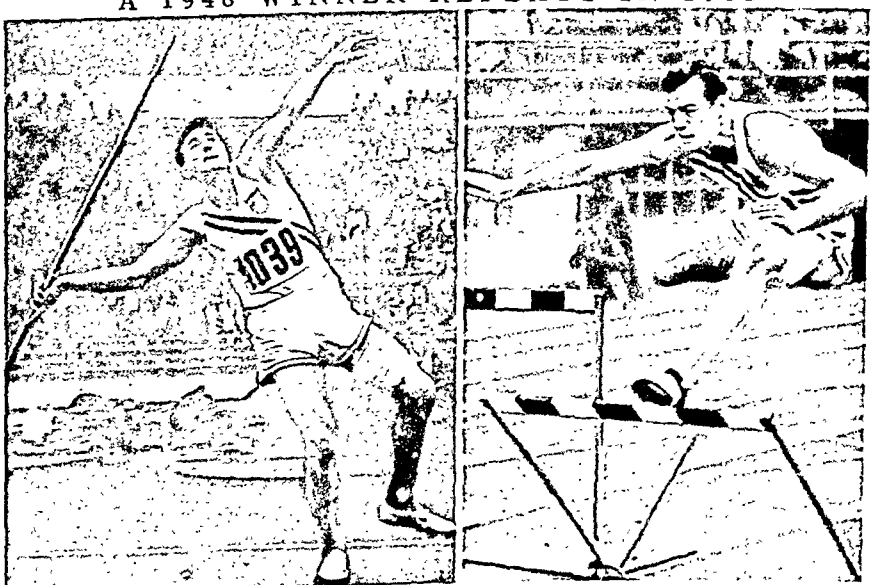
The recorded history of the Olympic Games began in Greece in 776 B.C. The Greeks later took this date as a convenient basis for computing time. They used the "olympiad," or four-year interval between celebrations, as the unit of their calendar.

The games were staged in one of the fairest spots in Greece—the wooded valley of Olympia in Elis. Here the best artists of the time erected statues and built temples in a sacred grove dedicated to Zeus, supreme among the gods. Greatest of all the shrines was an ivory and gold statue of Zeus himself. Created by the sculptor Phidias it was considered one of the Seven Wonders of the World (*see* Seven Wonders of the World).

After sacrifices had been made in the grove to Zeus and other gods the athletes marched to the nearby stadium. At first the only event was a 200-yard dash. Later this was supplemented by the pentathlon, a five-fold match consisting of running, wrestling, leaping, throwing the discus, and hurling the javelin. (This was the forerunner of the pentathlon contested in the modern Olympics.) In time other events were added, including boxing and a chariot race.

The victors were crowned with simple wreaths from a sacred olive-tree which grew behind the temple of Zeus. According to tradition this tree was planted by Hercules (Heracles), the founder of the games. The winners then marched around the sacred grove to the accompaniment of a flute while their admirers chanted triumphal songs written for the occasion by some great poet. When the victors returned to their

A 1948 WINNER REPEATS IN 1952



The greatest all-around athlete in the 1952 Olympics was Robert Mathias of Tulare, Calif. He won the 10-event decathlon with a total of 7,887 points, a new world record. Here he throws the javelin (left) and runs the 110-meter hurdle race.

homes they received great honors. Cities erected statues to them, gave them places of honor on public occasions and exempted them from taxes. In some cities the heroes lived thereafter at public expense.

These ancient contests also had a religious significance, for the Greeks believed that the body of man had a glory as well as his spirit. They thought that men could best honor Zeus by developing mind and body in harmony. The Olympics also exerted an ennobling influence on the life of the Greeks. A sacred truce was proclaimed before the opening of a festival, and if any cities were at war, fighting ceased during the celebration. Men from all parts of the Greek world came together on these occasions, strengthening friendship and unity. Under Roman rule the games continued but relations between the Romans and Greeks became so bitter that Emperor Theodosius abolished the Olympics in A.D. 394.

OMAHA, NEB. During the middle 1800's, a spot on the west bank of the Missouri River, now the site of Omaha, was the "gateway to the West." Explorers, trappers, traders, gold seekers, and settlers paused here for rest and a last inspection of equipment before plunging on into the wilds. Frontier storekeepers sold the adventurers supplies for the dangerous trek ahead.

Today Omaha is Nebraska's greatest city. It lies at the eastern end of the state, across the river from Council Bluffs, Iowa. From the surrounding large fertile areas, livestock and grain pour into the city's markets. Omaha's stockyards and meatpacking plants slaughter and process about 4 million animals a year. Its dairies churn more butter than those of any other American city. A large distilling plant produces millions of gallons of alcohol and many tons of corn oil. Lead ore is brought from Colorado mines to be refined in Omaha's great smelter. Many large insurance companies make the city their headquarters. Rail, air, bus, and truck lines radiate from the city. And Omaha is a wholesale- and retail-trade center for a wide-spreading area.

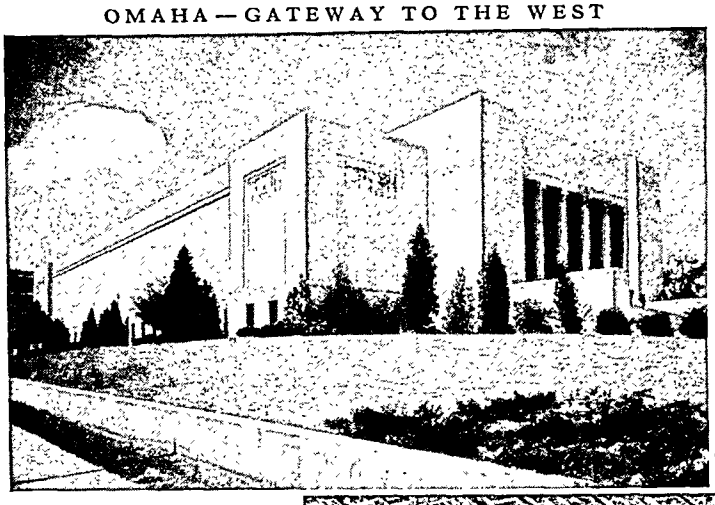
Omaha has been built into a modern city. An extensive boulevard system connects its large, beautiful parks. It is the seat of the University of Omaha, Creighton University, Duchesne College of Arts and Sciences, and a Presbyterian theological seminary. The great Joslyn Memorial houses a permanent art collection and brings guest exhibits to the city; the memorial also supports an extensive art library and a fine concert hall.

Ak-Sar-Ben (the name is Nebraska spelled backward), a civic organization established in 1895, carries on many activities to promote interest in Omaha and Nebraska's history and progress. They conduct annual stock shows, horse-race meets, and elaborate balls. Boys Town, the famous shelter for homeless boys established by Father Flanagan in 1917, lies about ten miles west of the city.

The site of Omaha was the start of an overland route first used by the Indians and later by white men. During the winter of 1846–47, some 12,000 Mormons camped here before beginning their heroic trek to Utah. Many of the Oregon settlers as well as the California gold seekers passed through Omaha. From Omaha outfitters the pioneers bought their last supplies for the trail. Omaha was called the "provisioner of the West."

The settlement was formally established in 1854, when the Omaha tribe of the Sioux Indians ceded the site to the whites. Omaha was the capital of Nebraska Territory until it became a state in 1867. Since 1923 the city has had the commission form of government, and in 1946 it adopted long-range plans for city development. (*See also* Nebraska.) Population (1950 census), 251,117.

OMAHA—GATEWAY TO THE WEST





Top, the Joslyn Memorial Building contains a splendid art collection. It is one of the most popular art museums in the United States. Bottom, in the foreground rises the administration building of Omaha's giant Union Stock Yards. The receiving sheds are at the left and animal pens cover the rest of the area.

O'NEILL, EUGENE GLADSTONE (1888–1953). From his experiences as a sailor, roustabout, salesman, reporter, and actor, Eugene O'Neill drew material for his plays. They deal realistically with psychological and social problems. O'Neill as readily broke theatrical conventions as in his life he broke the conventions of society. Some of his works are so long that audiences must be given recesses so that they may eat. As a dramatist, O'Neill was one of the world's most respected and widely read.

He was born Oct. 16, 1888, in New York City. His father was an actor, famed for his role of Edmond Dantès in 'The Count of Monte Cristo'. Until he was eight years old, Eugene traveled with his father's company. He was then sent to private schools. As a boy he was shy and often moody. He entered Princeton in 1906 but was dropped at the end of his freshman year for failing three subjects.



EUGENE O'NEILL

O'Neill was one of America's best-known dramatists. He won both the Nobel and the Pulitzer prizes.

O'Neill determined to see something of the world. But before he sailed to hunt gold in Honduras, he married. While he was gone his wife bore him a son. O'Neill's hunt uncovered no gold, and he worked as seaman, salesman, and stevedore. In 1911 he drifted back to New York City. He did not find regular work or return to his wife. When money was short, he slept in barrooms. In 1912 his wife divorced him.

O'Neill went to sea again, played bit parts for his father, and was a reporter for a Connecticut paper. His editor liked his modesty and literary style. But O'Neill had contracted tuberculosis on his wanderings. Late in 1912 he entered a sanatorium.

Here he read Ibsen and Strindberg and, after a partial recovery, began writing one-act plays. The Provincetown Players staged some of these. Three were published in *The Smart Set*, a magazine edited by George Jean Nathan and Henry L. Mencken. O'Neill married a second time in 1918. He had two children by his second wife; again he was divorced.

In 1920 his full-length play 'Beyond the Horizon' won the Pulitzer prize. In 1922 'Anna Christie' won another. O'Neill's philosophy rejected formalized religion, but he believed in spiritual values. He liked physical exercise and to watch sports events. Yet he was much alone. In 1928 'Strange Interlude' won him a third Pulitzer prize. He journeyed to Paris and there in 1929 he married a third time. In Paris he began 'Mourning Becomes Electra'. It was first played in 1931.

In 1936 O'Neill was awarded the Nobel prize in literature, the first American dramatist to win it. For a time he abandoned work, but in 1946 his very successful 'The Iceman Cometh' was produced. Other well-known works are 'The Emperor Jones' (1920); 'Desire under the Elms' (1924); 'The Great God Brown' (1926); 'Marco Millions' (1927); and 'Ah, Wilderness!' (1933), his only comedy.

ONION. Men cultivated onions before the beginning of history. Ancient Egypt sacrificed one variety to a god. The onion, native to Southwestern Asia, now is cultivated over much of the world. It needs a fertile, well-worked soil that is moist in the early season and dry in the late. Either *seeds* or *sets* are planted. Sets are small bulbs or a clove of a separable bulb, or bulbels (which appear in the growing onion's flower cluster). Green, or table, onions are pulled before maturity. Ripe onions are kept in the ground until the tops wither. Then the bulbs are pulled. There are many onion varieties, including the mild Spanish and Bermuda, and the more strongly flavored Danvers, Wethersfield, and Southport. A hybrid onion has been developed that yields from 46,000 to 75,000 pounds to an acre. The United States crop is about 800,000 tons a year. The common onion (scientific name, *Allium cepa*) belongs to the lily family *Liliaceae*. Closely related plants are the shallot, the chive, the leek, and the garlic.



ONIONS ARE GROWN OVER MOST OF THE WORLD

Left, a great field of onions pushes its blossoms high in the air. Right, onion blossoms or "buds" are shown in a close-up. The blossoms range in color from lilac to white. In some onion varieties bulbels (small bulbs) grow among or in place of the buds and are planted in the spring after their appearance. Onion plants vary in height, the highest growing to about four feet.

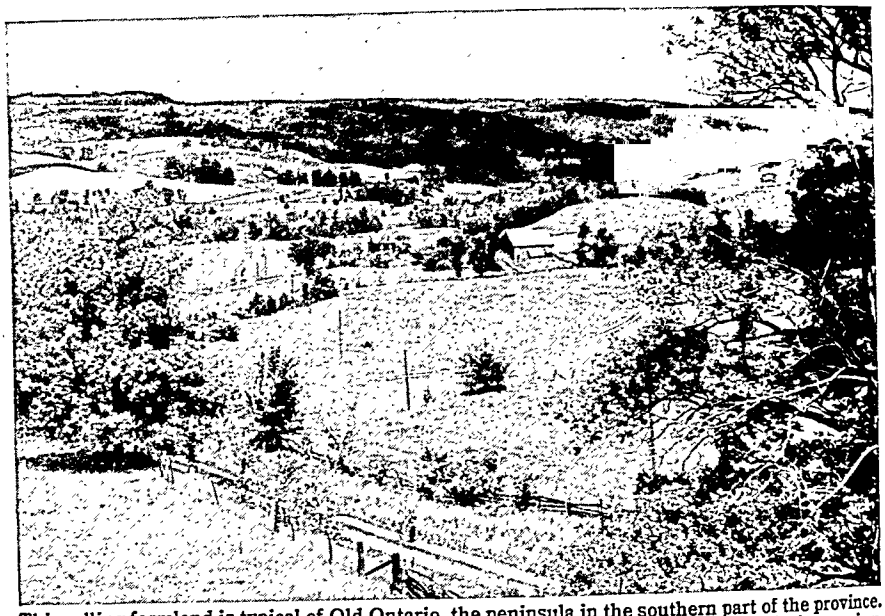
The INDUSTRIAL HEART *of the* CANADIAN NATION

Extent.—Greatest length east to west, about 1,000 miles; north to south, 1,075 miles. Area, 412,582 square miles, including 49,300 square miles of water surface. Population (1951 census), 4,597,542.

Natural Features.—Great Lakes (Superior, Huron, Erie, Ontario) and St. Lawrence River; James Bay (an arm of Hudson Bay). Lakes: Nipissing, Nipigon, Lake of the Woods, and numerous lesser lakes. Principal rivers: Ottawa (entering St. Lawrence), Albany, Moose, Attawapiskat, and Severn (entering Hudson Bay). Highest point, Tip Top Hill, 2,120 feet; lowest point, sea level, at James Bay.

Products.—Automobiles, meat, pulp and paper, nonferrous metal smelting, iron and steel, farm implements, electrical machinery, rubber goods, petroleum products; hay and clover, oats, wheat, mixed grains, alfalfa, potatoes, fodder corn; milk, hogs, cattle, eggs, poultry; nickel, gold, copper, sand and gravel, iron ore, platinum; lumber; furs; fish.

Cities.—Toronto (capital—675,754, 1951 census; 1,117,470, after 1953 federation with suburbs); Hamilton (208,321); Ottawa (202,045); Windsor (120,049); London (95,343).



This rolling farmland is typical of Old Ontario, the peninsula in the southern part of the province. The rich soil and favorable climate are ideal for mixed farming, dairying, and fruit growing.

ONTARIO, CANADA. Canada's richest and most populous province is Ontario. It has nearly one third of Canada's people. Half of Canada's manufactures, a third of its minerals, and a third of its farm wealth come from Ontario. The nation's political life centers in Ottawa, capital of the nation. Toronto, capital of Ontario, became Canada's largest city in 1953 by federation with its suburbs.

Ontario sweeps for a thousand miles from Quebec on the east to the prairies of Manitoba on the west and for almost 1,100 miles northward from the Great Lakes to Hudson Bay. Its vast area of 412,582 square miles is nearly five times larger than Great Britain and as great as the section of the United States from Illinois to Maine.

The land is divided into two regions. These are the southeastern peninsula, or the Wedge; and the Laurentian Plateau, also called the Canadian Shield. Popularly, they are known as Old and New Ontario.

Old Ontario is a wedge-shaped peninsula which juts southward between Lake Huron on the west and Lakes Erie and Ontario on the east. The tip of the wedge almost touches Detroit, Mich., across the Detroit River. The base of the wedge is on the Ottawa River and the Quebec boundary. In this area are the great majority of Ontario's people, practically all its agriculture, and most of its manufacturing.

Northwest of the peninsula lies the major portion of Ontario's area. It is part of the vast Laurentian Plateau (*see* Laurentian Plateau). This is a rocky upland with countless lakes and rushing streams and blanketed with evergreen forests. The ancient pre-Cambrian rocks of the plateau are great treasure chests, producing enormous fortunes in minerals. The rapid development of the mines and smelters, the lumber, pulp, and paper mills, and the growth of population around these centers have earned the plateau the title of New Ontario.

Agriculture in New and Old Ontario

The southern peninsula leads in agriculture because it is the only section of the province with both a mild climate and a deep, fertile soil. Like the nearby states of Michigan and New York, its climate is tempered by westerly winds that blow across the Great Lakes. The region specializes in growing fruits, grapes, and vegetables. It is famous for its dairy and meat products. It makes three fourths of the cheese produced in Canada. Hay, alfalfa, potatoes, tobacco, and oats, wheat, and other grains are leading crops.

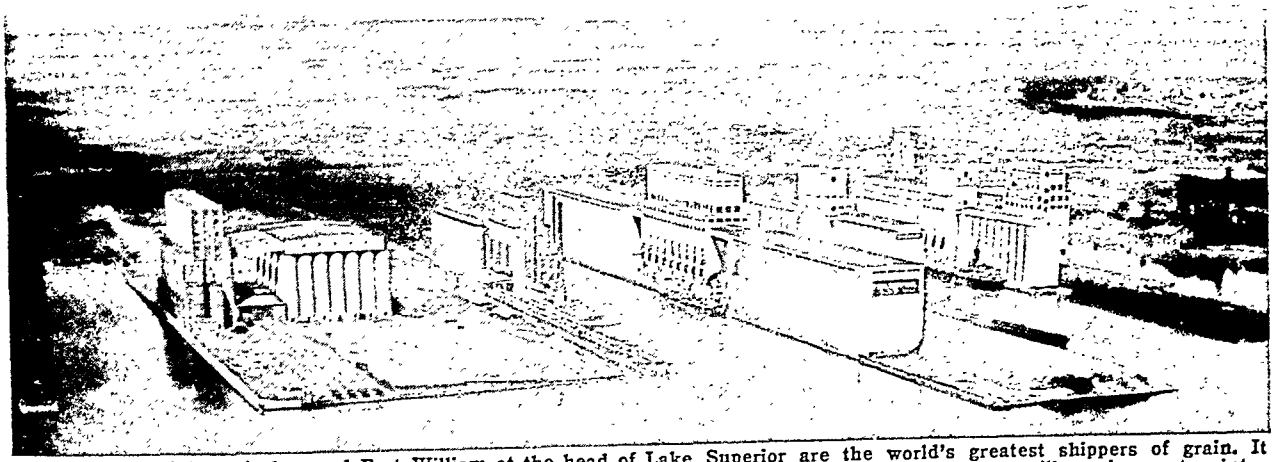
The thin, sandy soils of the Laurentian Plateau are unsuited to agriculture. Scattered "clay pockets" support a few farms, but they are isolated in the forests. The long, severe winters and lack of communication also discourage settlement.

On the northern edge of the plateau, bordering the south and west shores of James Bay, is the so-called clay belt of northern Ontario. This is a strip of low land under 500 feet in elevation and varying in width from 100 to 200 miles. The soil is a deep, fertile clay. Temperatures are extreme, but not as severe as farther south where the altitude is higher. Several provincial experimental farms are demonstrating the possibilities of mixed farming adapted to the short growing season, but some 16 million acres of rich agricultural land are still virtually untouched. Air express may solve the problem of settlement in this distant region by carrying in farmers' supplies and flying the produce.

Busy Industries in Old Ontario

Manufacturing has been drawn to the southern peninsula for several reasons. The large and concentrated population provides a ready labor market. Close at hand are raw materials—timber and minerals to the

GRAIN ELEVATORS OF PORT ARTHUR-FORT WILLIAM



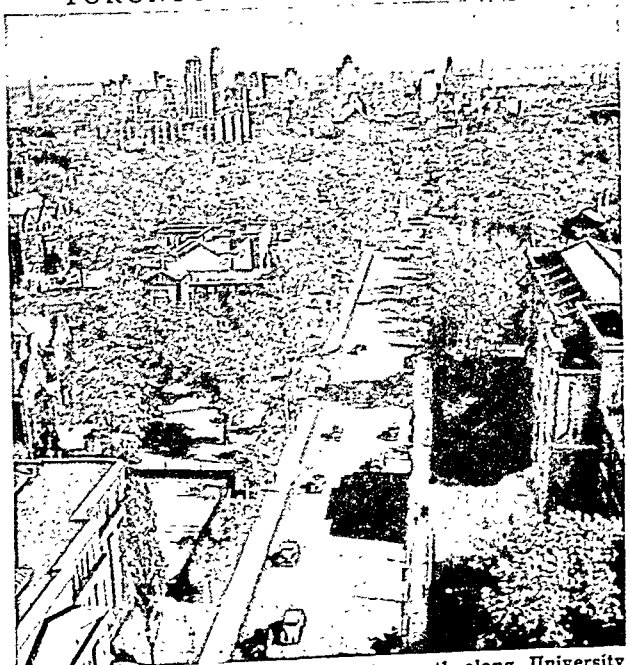
The twin ports of Port Arthur and Fort William at the head of Lake Superior are the world's greatest shippers of grain. It comes from the wheat fields of western Canada and goes by freighters on the Great Lakes to eastern mills and export points.

north and farm products in the neighboring countryside. Cheap fuel and cheap transportation are available. Coal is lacking, but the region is abundantly supplied with water power from Niagara Falls and from the rapids of the St. Lawrence and Ottawa rivers and their tributaries. The Ontario Hydroelectric Power Commission is one of the world's largest power producers. It is a coöperative enterprise, owned and operated by the participating municipalities, which provides electricity to consumers at cost.

The Great Lakes carry iron from the mines of Minnesota and western Ontario, and coal from Pennsylvania directly to the peninsula's steel mills. The products of mill and factory are distributed by air, rail, and water to all sections of the country. (*See* Canals; Great Lakes; Sault Sainte Marie; Welland Ship Canal.) The leading industries are automobiles, meat packing, pulp and paper, nonferrous metals, iron and steel, farm implements, electrical machinery, and rubber goods.

Along the shores of the Great Lakes rise busy industrial cities—Toronto; Hamilton, center of Canada's steel industry; Windsor, center of the automobile industry; Kingston, and Sarnia. In the heart of the peninsula is London, metropolis of the rich agricultural area; and to the north on the Ottawa River is Ottawa, capital of Canada (*see* Hamilton; Kingston; London; Ottawa; Toronto; Windsor).

TORONTO'S PLEASING SKYLINE



This view of Toronto's skyline looks south along University Avenue to Queen's Park and the Parliament buildings. Buildings of the University of Toronto flank the avenue.

The chief cities of the Laurentian Plateau are the mining centers of Sudbury, Kirkland Lake, and North Bay; Sault Sainte Marie on the ship canal between Lakes Superior and Huron; and the twin cities of Port Arthur and Fort William, world's greatest grain-shipping ports, at the head of Lake Superior (*see* Fort William; Sault Sainte Marie). Most of the cities and towns are strung along the two railroad lines, the Canadian Pacific and the Canadian National, which run east and west across the southern half of the plateau. Only one line, the provincially owned Temiskaming and Northern Ontario, runs north, from North Bay to Moosonee on James Bay. The first motor road across the plateau, the Ontario section of the Trans-Canada Highway, was opened in 1942.

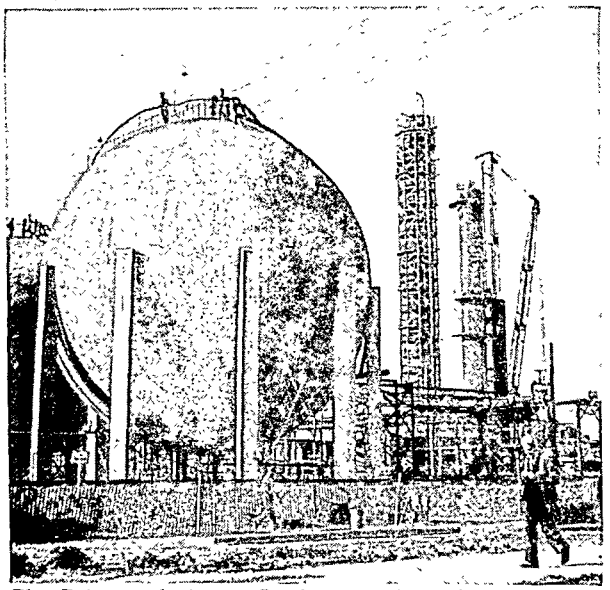
Mineral and Forest Resources

Ontario leads all the provinces in the total production of minerals. Only a small part of the plateau has been prospected, and possibilities for future production are great. The mines at Sudbury yield 90 per cent of the world's nickel and almost half its platinum. Porcupine, Kirkland Lake, Red Lake, and other Ontario fields make Canada third in the world's production of gold. Cobalt is famous for its silver and cobalt. At Steep Rock Lake, west of Port Arthur, high-grade iron ore is extracted. Lead, copper, and zinc are abundant, and uranium ore

is also mined. The southern peninsula produces natural gas, petroleum, feldspar, mica, salt, and clay.

The forests are another of Ontario's profitable resources. The province has under supervision and fire protection more than 150 million acres of timberland, and vast areas in the north are still unsurveyed.

WAR BRINGS SYNTHETIC RUBBER TO SARNIA



The Polymer plant near Sarnia was built during the second World War to manufacture synthetic rubber. The sphere in the foreground is one of 13 in which hydrocarbons are stored. The plant makes two types of rubber, buna-S and butyl. By-products are used in adjacent plants making plastics.

With unlimited water power at hand, lumber, pulp, and paper mills have sprung up across the southern part of the plateau. Ontario is second to Quebec in the production of wood pulp and paper, chiefly newsprint, and is third in sawed lumber.

Ontario's Progressive People

Ontario is particularly exposed to the commercial goods, the movies, radio, and advertising of the United States and is more American in appearance than any other province. Its people are nevertheless stanchly British. About 67 per cent of them are English, Scottish, or Irish in origin. Another 10 per cent of the population is French. The remainder is chiefly a mixture of north European peoples. There are about 37,000 Indians.

Ontario draws 70 per cent of the nation's total tourist business, most of it from the United States. Fine highways throughout the southern peninsula and the Trans-Canada Highway north of Lake Superior have made the forests, lakes, and streams of the province accessible to campers and sportsmen. Georgian Bay and the Thousand Islands of the St. Lawrence River are among the most popular vacation resorts. A number of islands in both regions are now national parks. On Lake Erie is Point Pelee National Park. Algonquin Provincial Park has nearly 3,000 lakes in its 2,741 square miles. Quetico Provincial Park, in the Rainy Lake district northwest of Lake Superior is a game sanctuary covering 1,860 square miles (*see* National Parks). Muskoka district, Haliburton, Lake Timagami, Lake Nipigon, and Lake of the Woods are also popular.

Government and Education

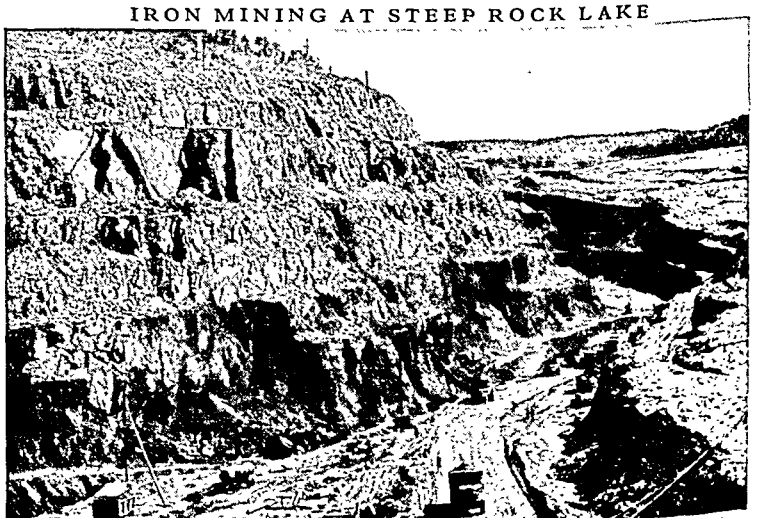
The representative of the British Crown and sovereignty is the lieutenant governor. He is appointed for a term of five years by the governor general of the country. He functions through an executive council whose members must also be members of the legislature. The actual executive head of the province and the executive head of the council is the prime minister. The legislature consists of a single house of 90 members elected for a five-year term.

The minister of education, who is a member of the Provincial Cabinet of Ministers, heads the Ontario Department of Education. Along with all other cabinet ministers he gains office when his party wins control of the government. The permanent administrative head of the department is the chief director of education, who is appointed by order in council.

Local administration is under the control of school boards. The elementary school boards are elected by popular vote. Roman Catholics may establish "separate" elementary schools and elect their own boards to administer them. Thus there are "public" schools, mainly Protestant, and "separate" schools, mainly Roman Catholic. Public secondary education in the main is nonsectarian and is administered by the elected boards of education or by appointed high school boards.

Higher education is provided by the University of Toronto at Toronto, Queen's University at Kingston, the University of Western Ontario at London, McMaster University (Baptist) at Hamilton, the University of Ottawa (Roman Catholic) at the national

IRON MINING AT STEEP ROCK LAKE



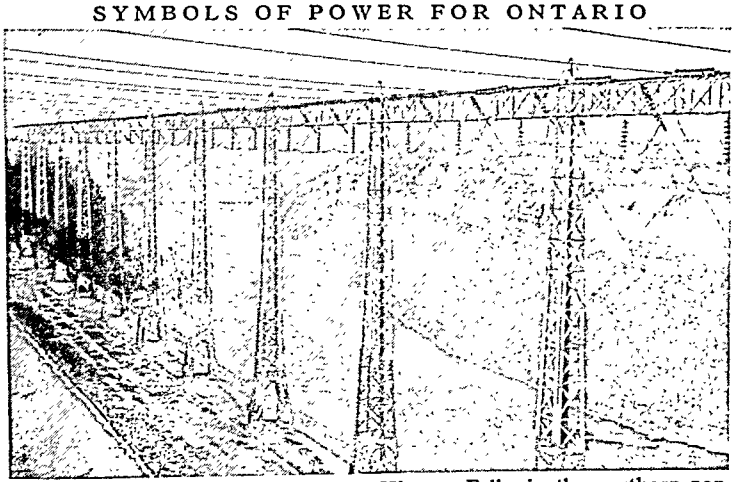
At Steep Rock Lake, 140 miles west of Port Arthur, is Canada's first iron mine, brought into production in 1944. The lake was drained to reach the ore below its bed.

capital, and the Ontario Agricultural College at Guelph. These are supported by the province. The Royal Military College at Kingston is maintained by the federal government.

Landmarks in Ontario History

Ontario claims the oldest evidence of European exploration in the Western Hemisphere. In 1931 near the town of Beardmore near Lake Nipigon, Viking weapons of the late 10th century were discovered. (*See* Canadian History.) For nearly 200 years after the founding of New France in eastern Canada, Ontario remained untouched by civilization. The hostility of the Iroquois barred the French from permanent settlement beyond Montreal. Between Georgian Bay and Lake Simcoe lay Huronia, land of the Huron Indians. These were a peaceful people who lived in palisaded villages and practiced a primitive agriculture. They traded with the French and welcomed the Jesuit missionaries who came to live among them. In 1649 the Iroquois massacred all but a few score of the Hurons. Almost 25 years later, in 1673, Count Frontenac, governor of New France, challenged the power of the Iroquois by building Fort Frontenac at the outlet of the St. Lawrence River, where the city of Kingston now stands (*see* Frontenac). The country beyond, however, remained almost entirely unsettled.

SYMBOLS OF POWER FOR ONTARIO



Hydroelectric power is generated at Niagara Falls, in the southern peninsula of Ontario. This view of transmission line towers was taken from the roof of the power plant at Queenston, below the falls. Beyond the towers, the Niagara River races toward Lake Ontario.

The real founders of the province were a band of British sympathizers who suffered persecution as Tories in the United States during the American Revolution. In 1783 about 10,000 of these United Empire Loyalists settled on the northern shores of Lakes Erie and Ontario and the upper St. Lawrence River. They became an independent people, with a tradition of self-government, and exerted a powerful influence on the political development of Canada (*see* Canadian History). Refusing to adopt the French civil law and Roman Catholic faith of their neighbors to the east, in 1791 they forced the division of Canada into two separate colonies known as Upper Canada (Ontario) and Lower Canada (Quebec).

Ontario bore the brunt of the War of 1812 (*see* War of 1812). The Americans underestimated the loyalty and ability of the handful of farmers in Upper Canada. They were defeated by the Canadians when Isaac Brock and his Indian ally Tecumseh seized Detroit at the war's outset. York, now Toronto, the capital, was twice burned by the Americans. At the indecisive battles of Queenston Heights, where Brock was killed, Lundy's Lane, and others, the Loyalists again showed their determination to remain British.

In 1837 the rebellion headed by William Lyon Mackenzie took place. Although promptly quelled, it hastened the redress of the political evils which had provoked it (*see* Mackenzie). Ontario was reunited with Lower Canada, or Quebec, in 1841. In 1867 Ontario became a part of the newly formed Dominion of Canada as a separate province. The first prime minister of Canada was Sir J. A. Macdonald, who led the young nation for the next quarter century (*see* Macdonald). In 1872–96 Sir Oliver Mowat was prime minister of the province. He was influential in defining the limits of federal and provincial authority.

Before World War I, population grew rapidly by immigration from Europe. During World War II Ontario's mineral and industrial output expanded. After the war, Ontario encouraged immigration from the British Isles and developed its resources. A treaty between the United States and Canada in 1950 provided for increased power at Niagara Falls. The St. Lawrence Seaway Authority began work on a power and navigation project in 1952. Expansion of Canada's largest atomic reactor at Chalk River was planned. An oil pipeline to Sarnia from Alberta by way of Superior, Wis., was completed in 1953. Population (1951 census), 4,597,542. (For Reference-Outline and Bibliography, *see* Canada; Canadian History.)

ONTARIO, LAKE. The smallest and easternmost of the Great Lakes was discovered by Étienne Brûlé and explored by Samuel de Champlain in 1615. It was the first to carry the commerce of the New World. The first steamboat on the Great Lakes, the *Frontenac*, was launched near Kingston, Ontario, in 1816, and in 1817 the *Ontario* was launched on the American side. The lake is 193 miles long and 53 miles wide, with an area of 7,540 square miles. Its surface lies 246 feet above sea level and its greatest depth is 774 feet.

It is fed principally by the Niagara River, through which the waters of Lake Erie rush in a terrific tumble of 326 feet in 36 miles. Since 1829 vessels from Lake Erie have been able to go around Niagara Falls and into Lake Ontario through the Welland Ship Canal. The lake is connected with the Hudson River by the New York State Barge Canal, with Georgian Bay by the Trent Canal, and with the Ottawa River by the Rideau Canal. The principal ports are Toronto, Hamilton, and Kingston, in Ontario; and Oswego, in New York. (*See* Canals; Great Lakes; Welland Ship Canal.)

OPERA. Like many beautiful things in our modern world, grand opera had its beginnings in ancient Greece. The great tragedians combined music, poetry, and dance to tell their dramatic tale; the actors would recite their dialogue with special intonations, while with their voices moved the music of lyre or flute, in harmony with the theme of the drama. This was not precisely grand opera, but from it came opera, centuries later. (*See* Drama; Greece; Greek Language and Literature.)

The old Greek entertainment was forgotten during the Middle Ages, but then came the Renaissance, and Europe turned back to the splendid, lost, pagan world (*see* Renaissance). A group of cultivated men in Florence, called the *Camerata*, revived some of the old Greek plays, with musical accompaniment, at the aristocratic house of Bardi in 1584. Music, finding new wings in these stirring days, suggested fresh harmonies for this new-old entertainment, and poets supplied new plays. In 1600 the first opera was given in public, Jacopo Peri's musical setting of the poet Ottavio Rinuccini's 'Eurydice'.

It is sometimes erroneously stated that the first opera was 'Le Jeu de Robin et de Marion', by Adam de la Halle, produced in Naples in 1285. This production, however, was nothing more than a pastoral in dramatic form, with the dialogue broken by extraneous ballads. The music had no connection with the drama, nor was any part of the drama enhanced, interpreted, or accompanied by music. Opera did not begin with this pastoral, but with the efforts of the Camerata.

MME. SCHUMANN-HEINK



The great contralto as Erda, the earth goddess, in Wagner's opera 'Siegfried'.

Monteverde's Bold Step

Claudio Monteverde, one of the pioneering spirits of the period, at once recognized the possibilities of the Camerata's new plaything, and made a living work of art out of their previous wooden imitations of the Greeks. His pupil, Pietro Francesco Caletti-Bruni, better known as Cavalli, permitted the actors to halt the action and sing a song, the first operatic aria. In so doing he nearly destroyed opera, for his successors allowed the aria to "run away with the show." Even Alessandro Scarlatti, who founded the Neapolitan school in the late 17th century, was unable to give drama its proper dominance in opera. He did produce the first operas in which all the words were sung, with no recitative.

All forms of Italian art were rapidly spreading to other countries. Opera entered France with the red cloak of Cardinal Mazarin, who brought in his wake a kitchen scullion, Giovanni Battista Lulli, who became known as Jean Baptiste Lully. By a rapid rise he became head of the Royal Academy of Music, fostered the ballet in opera, and originated the overture. France was always inclined to emphasize the ballet and the pageantry of opera, Italy the music and the aria, Germany the drama.

The downfall of the ranting and oppressive aria came only with the German, Christoph Willibald Gluck, in the 18th century. Disgusted with the Italian operas, in which composers showed off their learning and singers their voices, he stirred up a tempest by writing operas in which choruses and solos were not allowed to bring the drama up short, at an awkward moment.

At about the same time the humorous Neapolitans, who had never taken the heroics of opera too seriously, introduced between acts lively musical farces, often parodies of grand opera, which they called *opera buffa* (funny opera). Opera buffa became the ancestor of both *opéra comique* and *opéra bouffe* in France. Opéra comique was not comic at all, but differed from grand opera only in having some of its dialogue spoken, not sung. Opéra bouffe was farcical, irreverent, and light. The work of Jacques Offenbach crystallized the distinction between them. In Germany, opera buffa developed, in the hands of the genius Wolfgang Amadeus Mozart, into fine productions such as the dashing and tuneful 'The Marriage of Figaro'. The German opéra comique, called a *Singspiel*, includes Ludwig van Beethoven's 'Fidelio' and Carl Maria von Weber's 'Der Freischütz'.

Great as were the improvements made by Mozart in opera, they had no lasting effect. The Italians slipped back under the tuneful spell of the interfering aria, though Gioacchino Rossini in light opera and Gaetano Donizetti and Vincenzo Bellini in the more serious vein sought to raise the level of operatic standards. Giacomo Meyerbeer cleverly catered to the romantic taste of the times.

The next great upheaval came from Richard Wagner, who, true to German preferences, thundered with all his strength against the aria and the tinkling tune, wrote his librettos on mighty themes, made the music fit the mood, and the drama dominate the entire production. To him we owe the *leitmotif*, a recurring brief air to symbolize the return to the scene of a certain mood or a certain character. When Lohengrin comes on the stage, we hear the Lohengrin theme running in the music; when tragedy draws near, the music broods. (*See* Wagner, Wilhelm Richard.)

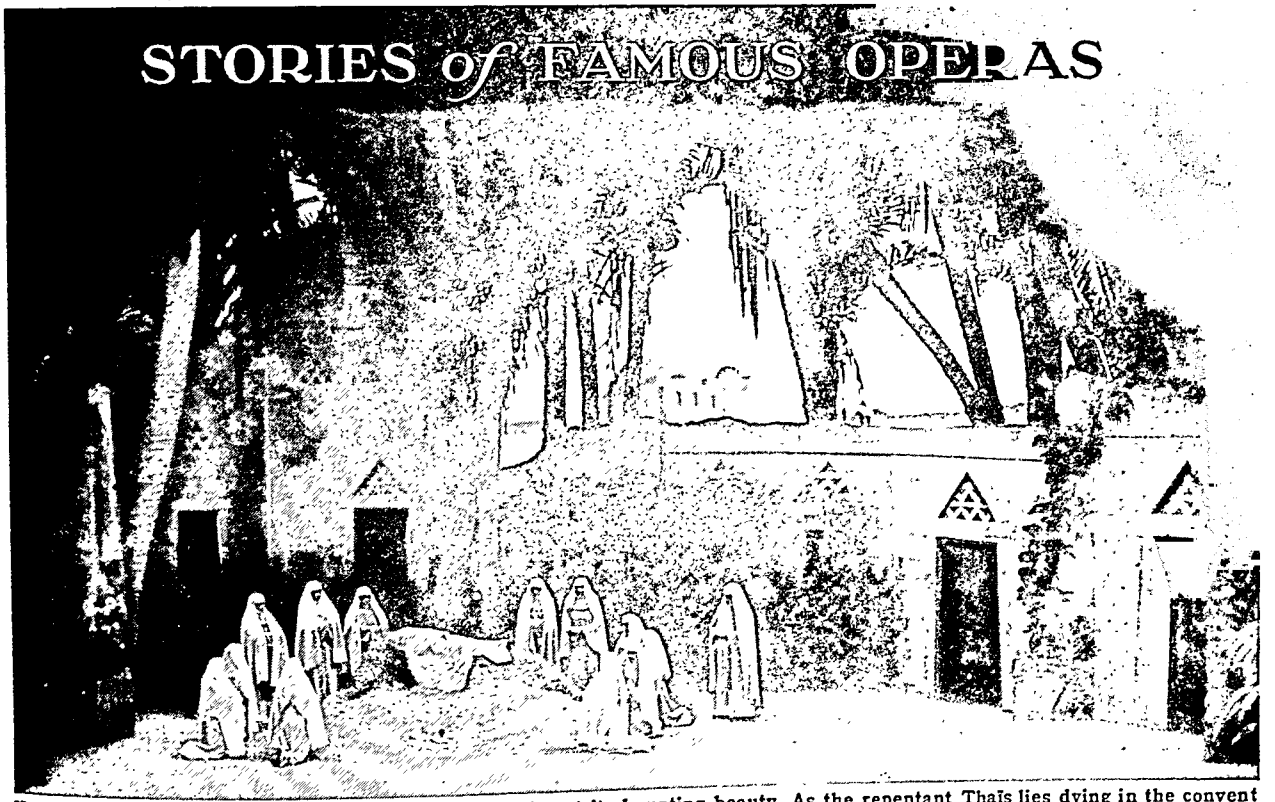
Great Names in Opera

Wagner's influence was felt in all countries. He had refused to call his later operas by the old name, but termed them "music dramas." Since his time, grand

opera has been more sincerely a drama set to music, and less of a musical "grand uproar," as the impious have sometimes called it.

In so brief a space, it is possible only to mention a few of the outstanding names on the long roster of famous composers of opera. These include, in France, Léo Delibes, Charles François Gounod, Georges Bizet, Jules Massenet, Charles Camille Saint-Saëns, and Claude Debussy; in Italy, Giuseppe Verdi, Arrigo Boito, Pietro Mascagni, Ruggiero Leoncavallo, Giacomo Puccini, Ermanno Wolf-Ferrari, and Italo Montemezzi; in Russia, Michael Ivanovich Glinka, Modest Moussorgsky, Nicholas Rimsky-Korsakof, and Peter Tschaikovsky.

A summary of the stories of a number of well-known operas is given in the following pages.



No one who has seen the last act of 'Thaïs' can ever forget its haunting beauty. As the repentant Thaïs lies dying in the convent garden, and the nuns chant their prayers, the lovely strains of the 'Meditation' are heard again, richer and more triumphant.

Aïda (*ä-ē'dä*). Rhadames, an Egyptian general (tenor) loves the captive princess Aïda (soprano). Through his love he unwittingly betrays his country and is sentenced to death. The Egyptian princess Amneris also loves Rhadames and offers to save his life if he will marry her. He refuses and is placed in a tomb, together with Aïda, and there the lovers die.

The work is majestic in conception, allowing of unbounded stage display. Best-known selections are: *Celeste Aïda* (Rhadames), *Ritorna vincitor* (Aïda), Act I, Scene I; the Grand March, Act II, Scene II; *O patria mia* (Aïda), Act III; *O terra addio* (Aïda and Rhadames), Act IV, Scene II.

Music by Verdi. Written 1869 at request of Khedive of Egypt; produced at Royal Opera House, Cairo (1871) to commemorate completion of Suez Canal. Italian. Four Acts.

L'Amore dei Tre Re (*lä-mō'rā dā'ē trā rā*). (The Love of Three Kings). Fiora (soprano) has been forced to marry Manfredo (barytone), son of the blind old King Archibaldo (bass). Secretly she meets Avito (tenor), her former fiancé. Archibaldo suspects her and when she admits her guilt, he strangles her. As she lies on her bier, Avito kisses her and dies of the poison Archibaldo has placed there to trap him. Manfredo kisses the lips also and dies.

Music by Italo Montemezzi; text by Benelli. Produced Milan, 1913. Italian. Three Acts.

The Barber of Seville. The libretto is based upon the first of a trilogy of 'Figaro' comedies by Beaumarchais. Plot concerns the efforts of Count Almaviva (tenor) to win the beautiful and wealthy Rosina (soprano). Her guardian, Bartolo (bass), watches her carefully, trying to keep her and her money for himself. Through the aid of the barber, Figaro (barytone), the Count wins the girl, making great sport of Basilio (bass), a music master and marriage agent.

Music by Rossini allows excellent chance for display of vocal skill, especially the well-known *Largo al factotum* (Figaro), *Una Voce poco fa* (Rosina), and *La Calunnia* (Basilio), Act I. Produced Rome, 1816. Italian. Two Acts.

La Bohême (*là bō-êm'*). In an attic of the Paris Latin Quarter, four friends are living gaily but precariously. Rudolph, a poet (tenor) is in love with Mimi, a frail little embroiderer (soprano), and Marcel, a painter (barytone) with Musetta (soprano). The lovers quarrel and part, but are reunited in the last act when Mimi, dying of consumption, is brought back to Rudolph. Well-known selections are: *Racconto di Rodolfo* (Rudolph), *Mi chiamano Mimi* (Mimi). Act I; 'Musetta's Waltz,' Act II; *Addio* (Mimi), followed by quartet *Addio, dolce svegliare* (Mimi, Rudolph, Musetta, Marcel), Act III; *Ah, Mimi, tu più* (Rudolph and Marcel), Act IV.

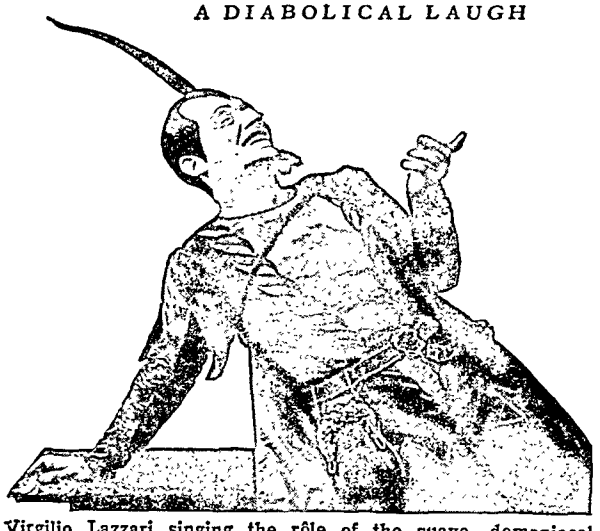
Music by Puccini; text founded on Mürger's book 'La Vie de Bohême' Produced Turin, 1896. Italian. Four Acts.

Car'men. The fiery Spanish gipsy, Carmen (soprano) is arrested for stabbing one of her companions, but she so fascinates Don José (tenor) that he allows her to escape. He deserts his old sweetheart Micaela (soprano), and follows Carmen, but when Carmen transfers her love to Escamillo (barytone), a bull-fighter, Don José, madly jealous, kills her.

The original spirited music is highly esteemed by both musicians and public. Most celebrated in rôle of Carmen was

Emma Calvé. Well-known selections are: The 'Prelude', *Habanera* (Carmen), Act I; the 'Toreador Song' (Escamillo), the 'Flower Song' (Don José), Act II; the 'Card Song' (Carmen), *Je dis que rien ne m'épouvante* (Micaela), Act III.

A DIABOLICAL LAUGH



Virgilio Lazzari singing the rôle of the suave, demoniacal tempter Méphistophélès in Gounod's popular opera 'Faust'.

Music by Bizet. Text based on story of Prosper Mérimée. Produced Paris, 1875. French. Four Acts.

Cavalleria Rusticana (*kä-väl-lā-rē'ä rụs'tē-kä'nä*) (Rustic chivalry). Action takes place in square outside a church in a Sicilian town on a glorious Easter morning. Turiddu (tenor), a soldier, has just returned from war to find his sweetheart Lola (mezzo soprano) married to Alfio (barytone). Turiddu then takes Santuzza (soprano), a village maiden, as his beloved but the jealous Lola wins him back. This leads to a duel with Alfio in which Turiddu is killed.

Music by Mascagni. Libretto based upon story of Giovanni Verga. Best-known numbers are the 'Prelude', including the simple love song *Siciliana* sung off-stage by Turiddu, and the 'Intermezzo'. First production Rome, 1890. Italian. One Act.

Faust. Weary of life, Faust (tenor), an aged philosopher, is offered youth and power by Méphistophélès (bass) in exchange for his soul. Shown a vision of the lovely Marguerite (soprano), Faust signs the compact. He wins Marguerite's love but betrays her. She finally dies in prison, her soul ascending to heaven, and Faust is carried off to the underworld.

Work abounds with lovely melodies popular the world over. Among them are 'Even Bravest Heart' sung by Valentine, Marguerite's brother, and 'The Calf of Gold' (Méphistophélès), Act II; the whole garden scene, Act III, including Siebel's 'Flower Song', Faust's 'All Hail Thy Dwelling', Marguerite's 'The King of Thule' and 'Jewel Song', and Faust's 'Let Me Gaze'; the 'Soldiers' Chorus', Act IV, and the prison scene, Act V; and all the ballet music.

Music by Gounod. Libretto based upon Goethe's poem 'Faust'. First production Paris, 1859. French. Five Acts.

The Huguenots. Scene is France, 1572. To pacify Catholic and Protestant parties, a marriage is planned between Valentina (soprano), a Catholic, and Raoul de Nangis (tenor), a Protestant. Mistakenly suspecting Valentina's honor, Raoul publicly denounces her, which leads to open fray ending in Massacre of St. Bartholomew. Too late, Raoul learns his mistake about Valentina and a love scene ensues between them just before he leaps to his death in the massacre.

Raoul's *Romanza*, 'Fairer than the Lily' and *Piff! Paff!*, song of Raoul's servant, Marcel, Act I, are well known.

Music by Meyerbeer. Text by Scribe and Deschamps. A showy opera both dramatically and musically. Produced Paris, 1836. French. Five Acts.

Jewels of the Madonna. The scene is Naples. Maliella (soprano) is in love with Rafaele (barytone) who boasts his love is so great he would even steal the jewels that deck the Virgin's statue for her. She taunts her other admirer, Gennaro (tenor) with the boast and he steals the gems. Finally, in terror, Maliella drowns herself; Gennaro returns the gems and stabs himself.

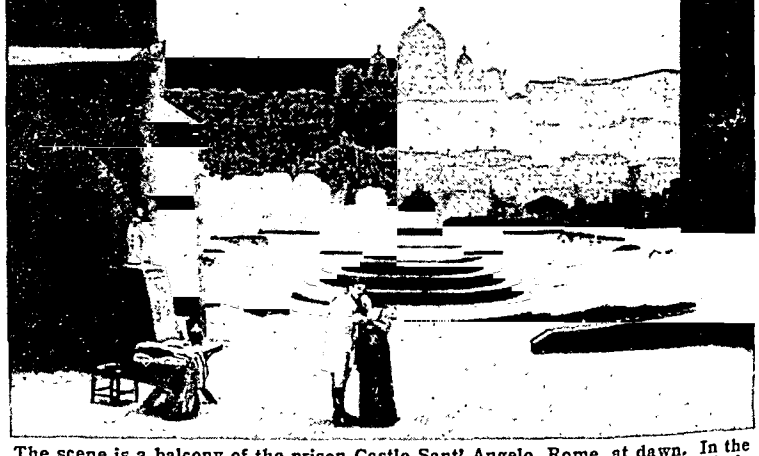
Music by Wolf-Ferrari. Produced Berlin, 1911. Italian. Three Acts.

Le Jongleur de Notre Dame (*le zhôn-glûr' de nôt'r dàm*). Jean, a street juggler enters a monastery. His friend, Boniface (bass), the cook, convinces him that any work well done is good in the sight of God. Jean shuts himself in the chapel and performs his tricks before the Virgin's statue. When the outraged monks rush in they notice the statue come to life, blessing Jean who dies at the altar. 'The Legend of the Sagebrush' (Boniface), Act II, is well known.

Massenet wrote the score for all male voices, but the rôle of Jean was frequently sung by Mary Garden. Libretto by M. Lena, from a medieval miracle play. Produced Monte Carlo, 1902. French. Three Acts.

La Juive (*là zhü-ēv'*) (The Jewess). The story is concerned with the hatred existing between Jews and Gentiles in the early 15th century. Disguised as a Jew the Prince of the Empire, Leopold (tenor), has been making love to Rachel (soprano), daughter of the old Jewish goldsmith *Eléazar* (tenor). The penalty for such love is death to both. When Leopold's betrothal is announced to the Princess Eudoxia (soprano), the jealous Rachel publicly exposes him as her lover. Later she repents and declares him innocent. He is released, but Eléazar and Rachel are condemned by the Cardinal (bass) to die in boiling oil or accept Christianity.

THE FINAL ACT OF 'LA TOSCA'



The scene is a balcony of the prison Castle Sant' Angelo, Rome, at dawn. In the background the Vatican and dome of St. Peter's are visible. Here Tosca and Mario sing their ironic last song of happiness.

Both refuse. Just as Rachel is plunged to her death Eléazar reveals her as the lost daughter of the Cardinal.

Music by Halévy. Text by Scribe. Produced Paris, 1835. French. Five Acts.

Lohengrin (*lō'ĕn-grĭn*). The young Duke Godfrey has disappeared and his sister Elsa (soprano) has been accused of his murder. When her champion is called for, a handsome knight (tenor) in a swan-driven boat appears. He makes one

important demand of Elsa. She must never ask his name or rank. On her wedding day, driven wild with curiosity by Ortrud (contralto), Elsa asks the fateful question. Before everyone the knight tells he is Lohengrin but departs immediately in his swan-driven boat. In glee, Ortrud shrieks that the swan is Godfrey whom she herself has bewitched. Lohengrin then frees the swan and the young duke appears. Lohengrin is lost to view and Elsa sinks lifeless to the ground.

Most popular selections are: 'Elsa's Dream' and Lohengrin's 'My Faithful Swan' in Act I; the 'Wedding March' and Lohengrin's 'Narrative', Act III.

Music and text by Wagner. Produced Weimar, 1850. German. Three Acts. Last work Wagner called by title of "opera."

Louise. Torn between duty to her parents and the longing for a full life, Louise (soprano), a little sewing girl, leaves home to live with Julien (tenor), an artist. They are happy in their little abode in Montmartre, Paris, when Louise's mother comes, telling of her father's illness. Louise returns home for a brief time, but, scolded by her parents, goes back to Julien. *Depuis le jour* (Louise), Act III, is well known. Words and music by Charpentier. Produced Paris, 1900. French. Four Acts.

Lucia di Lammermoor. (*lo͞o-chē'ä dē lä-mär-mo͞or'*). For financial reasons Sir Henry Ashton (barytone) tries to marry his sister Lucia (soprano) to Sir Arthur Bucklaw (tenor). But Lucia and Sir Edgar of Ravenswood (tenor) are in love. Sir Henry forges a letter and proves Sir Edgar false. Lucia marries Sir Arthur, but at the wedding feast Edgar dramatically reappears. Then follows the well-known sextet *Chi mi frena.* Lucia goes mad, kills the bridegroom, and a little later dies herself. Edgar, learning of her death, sings the mournful *Tu che a Dio spiegasti l'ali* and kills himself.

A popular but musically thin opera, allowing of great vocal display; has been a favorite of most coloraturas.

Music by Donizetti. Libretto based upon Scott's novel 'The Bride of Lammermoor'. First production in Naples, 1835. Italian. Three Acts.

MARY GARDEN



The alluring Fiora in 'The Love of Three Kings', one of Miss Garden's most successful rôles.

Madama Butterfly. To make his sojourn in Japan more amusing, Pinkerton (tenor), an American naval officer, "purchases" in Nipponese fashion, a Japanese wife, Madame Butterfly (Cho-Cho-San) (soprano). He sails away and is gone three years, not knowing how seriously Butterfly has taken his love and that she has borne him a son whom she calls "Trouble." When he returns with an American wife, Butterfly realizes the truth and stabs herself, giving up her baby to Pinkerton's wife.

Japanese folk-songs and American themes are richly interwoven in the music. No set arias, although the love duet of Butterfly and Pinkerton *Viene la sera*, Act I, and in Act II Butterfly's *Un bel dì* and *E questo?*, also the orchestral interlude, 'Waiting Music', are popular.

Music by Puccini. Text based upon book of John Luther Long and drama of David Belasco. Produced Milan, 1904. Italian. Three Acts (originally two).

Manon. On her way to a convent, the lovely young Manon (soprano) meets Des Grieux (tenor) at an inn. They are infatuated and elope to Paris. But tempted by the wealth of an old nobleman she leaves Des Grieux. Then learning Des Grieux has entered a monastery, she follows him and wins him back. In the end Manon is condemned as an abandoned woman. Des Grieux follows her as she is about to be deported and she dies in his arms.

Well known are Des Grieux' *Le Rêve*, Act II, and *Fuyez, douce image*, Act III.

Music by Massenet. Libretto based upon Abbé Prévost's novel 'Manon Lescaut'. Produced Paris, 1884. French. Four Acts.

Manon Lescaut (*mä-nôn lĕs-kō'*). The story is practically the same as 'Manon' (see above), both operas being based upon Abbé Prévost's novel 'Manon Lescaut'.

Music by Puccini. Presented Turin, 1893. Italian. Four Acts.

The Marriage of Figaro (*fē'gär-ō*). A lively farce based upon the second of the 'Figaro' comedies by Beaumarchais. The marriage of Figaro (bass), barber of the Count Almaviva, and Susanna (soprano), maid of the Countess Almaviva, is delayed by a series of amusing events caused by the Count's jealousy of Cherubino (soprano), his wife's page and admirer, also by the Count's own attentions to Susanna.

Music by Mozart, includes some of his most delightful melodies. Well known are the 'Overture', *Non so più* (Cherubino), Act I; *Voi che sapete* (Cherubino), Act II; and the letter duet of Act III. Produced Vienna, 1786. Usually sung in Italian. Four Acts.

Martha. For amusement, Lady Harriet (soprano) and her maid (contralto) hire themselves out as servants to two young farmers, Lionel (tenor) and Plunkett (bass). Lady Harriet becomes *Martha;* her maid, *Julia.* At the farmhouse it soon appears they can neither work nor spin. They escape that night but not before Martha has fallen in love with Lionel, Julia with Plunkett. Before the last curtain they are all happily betrothed; a ring proves that Lionel is the son of the banished Earl of Derby.

Of enormous popularity, the score is a succession of melodies familiar to almost everyone: 'The Last Rose of Summer' (an old Irish air) (Martha), the 'Spinning Quartet' and 'Good Night Quartet' (Martha, Julia, Plunkett, Lionel), Act II; *Canzone del porter* (Plunkett) and *M'appari* (Lionel), Act III.

ROMEO AND JULIET UNITED



In Friar Lawrence's cell the lovers are married. Here are Alice Mock as Juliet, Edouard Cotreuil as Friar Lawrence, and Charles Hackett as Romeo.

Music by Von Flotow. Produced Vienna, 1847. Usually sung in Italian. Four Acts.

Die Meistersinger von Nürnberg (*dē mīs'tĕr-zĭng-er fon nürn-berg*). (The Master Singers). Sir Walter von Stolzing (tenor) becomes enamored of Eva (soprano). He determines to win the Master Singers' song contest the following day in order to obtain her as a bride, although he knows nothing of the rules. Beckmesser, town clerk (bass), a pedantic stickler for rules and himself in love with Eva, opposes him. But Hans Sachs, a cobbler (bass) and a genuine musician, sees real inspiration in Walter's singing and favors him. At the contest Walter wins with his glorious *Preislied* ('Prize Song').

Text and music by Wagner (produced Munich, 1868) show him in his full genius as poet, humorist, and musician. The lovers and the cobbler are said to be symbols of art and life, Beckmesser of rule-blinded critics. Music throughout is a masterpiece of melodic and harmonic richness. The 'Prelude' and 'Prize Song' are well known. German. Three Acts.

Mignon (*mēn-yôn'*). A little dancing girl, Mignon (mezzo soprano), is saved from her gipsy master by Wilhelm Meister (tenor), a traveling student. He allows her to follow him as his page. She is in love with him but he is enamored of Filina (soprano), an actress. Mignon is injured in a burning castle and is brought to Italy by Lothario (bass), an old minstrel, who in reality is an Italian nobleman who has lost his memory. In the last act, however, his memory is restored. He recognizes in Mignon his long-lost daughter, stolen as a child by gipsies. Wilhelm recognizes his true love for Mignon and all ends happily.

Well-known selections are the 'Overture'; *Connais tu le pays?* (Mignon); *Les Hirondelles* (Mignon and Lothario), Act I; the *Polonaise* (Filina), Act II; the *Berceuse* (Lothario), Act III.

Music by C. L. Ambroise Thomas; text based on Goethe's 'Wilhelm Meister'. Produced Paris, 1866. French. Three Acts.

Otello. Libretto is based upon Shakespeare's tragedy, of same name (*see* 'Othello'). Music by Verdi, shows departure from the earlier Verdi manner. Well-known selections are Iago's *Credo*, Act II, Desdemona's 'Willow Song' and *Ave Maria* and the 'Death of Otello', Act IV. Produced Milan, 1887. Italian. Four Acts.

I Pagliacci (*päl-yät'chē*) (The Players). Opens with a prologue sung by clown Tonio (barytone). Canio (tenor), leader of a troupe of strolling players, is furiously jealous of his beautiful wife, Nedda (soprano), who is planning to run off with Silvio (barytone), a villager. In their little play a similar tragedy of a jealous husband and erring wife is enacted. In the play Canio stabs his wife, forcing her to call upon her lover Silvio, who rushes upon the stage and is killed by Canio, who then surrenders, singing, "Applaud, friends, the comedy is ended."

The 'Prologue' (Tonio), the *Ballatella* (Nedda), and Canio's lament, *Vesti la giubba*, Act I, also Canio's *No, Pagliaccio non son*, Act II, are well known.

Music and libretto by Leoncavallo. Produced Milan, 1892. Italian. Two Acts.

Pelléas et Mélisande. Music by Claude Debussy is entirely modern in manner, without set melody. Text is from Maurice Maeterlinck's play of the same name. Both text and music are weighted with mystic meaning.

Golaud (barytone) finds the mysterious Mélisande (soprano) in the wood and brings her back to the king's castle as his wife. There she and Pelléas (tenor), half-brother of Golaud, fall in love. Wildly jealous, Golaud slays Pelléas. Mélisande, maintaining the innocence of their love, dies in the palace. Produced Paris, 1902. French. Five Acts.

THREE GREAT ARTISTS IN RÔLES THAT MADE MUSICAL HISTORY



At the left is Mme. Nellie Melba as Marguerite in 'Faust', one of opera's celebrated portrayals. In the center is Jean de Reszke, usually ranked as the greatest of all Tristans, while at the right is Adelina Patti, famous for her portrayal of Juliet.

Rigoletto (*rē-gō-lĕt'tō*). The dissolute Duke of Mantua (tenor) has won the love of Gilda (soprano), daughter of the hunchback, Rigoletto (barytone). Rigoletto conspires to have the Duke killed, but Gilda sacrifices herself to save him, and Rigoletto is given the assassin's sack containing his own dying daughter.

An extremely popular opera despite its gruesome story. Best-known selections are *Quest' o quella* (Duke), Act I; Rigoletto's soliloquy, *Pari siamo*, and Gilda's *Caro nome*, Act II; *La donna è mobile* (Duke) and the famous quartet *Bella figlia dell' amore* (Gilda, Rigoletto, Duke, and Maddalena), Act IV (originally Act III).

Music by Verdi. Text founded upon Victor Hugo's drama 'Le roi s'amuse'. Produced Venice, 1851. Italian. Four Acts (originally three).

Der Ring des Nibelungen (The Ring of the Nibelungs), a vast musical work by Richard Wagner based on the old legends of the Nibelungs (*see* Nibelungs, Song of the). The whole work consists of 'Das Rheingold', an introduction to the dramas, 'Die Walküre', 'Siegfried', and 'Götterdämmerung'.

Das Rheingold (*däs rīn'gōlt*). The hideous dwarf, Alberich (barytone or bass) learns from the Rhine maidens that he who would renounce love forever might steal their treasure, the Rhine gold, and that a ring made from it would render the possessor master of the world. Alberich seizes the gold, has the ring made, also a magic helmet, *Tarnhelm*. Wotan (barytone), father of the gods, takes the gold ring and helmet from Alberich and gives it to two giants to repay them for building the new castle of the gods, Valhalla. Alberich puts a curse on the ring. The giants quarrel and one is slain. The gods proceed to Valhalla.

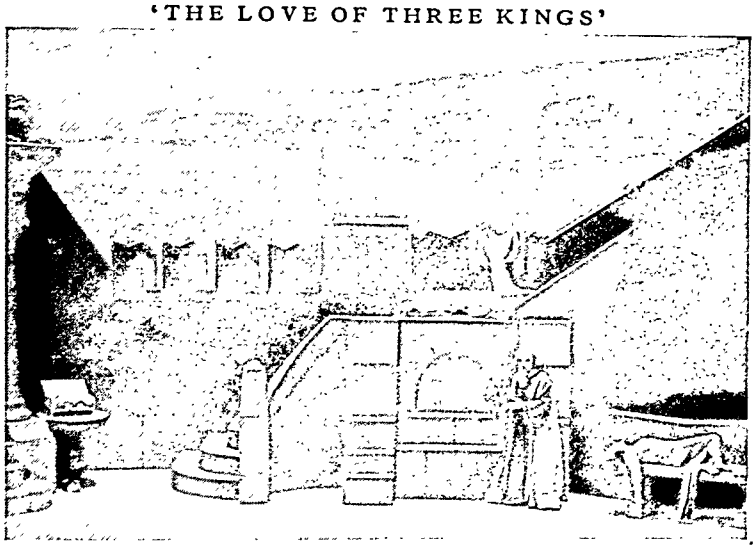
Produced Munich, 1869. German. Four Scenes.

Die Walküre (*dē väl-kü'rĕ*) (The Valkyries). The Valkyries are nine daughters of Wotan whose mission it is to ride forth each day on flying horses and bring to Valhalla the bravest

of the slain. Brünnhilde, their leader (soprano), is Wotan's favorite. However, in a fight between Wotan's earthly son Siegmund (tenor) and Hunding (bass), Brünnhilde protects Siegmund against orders. Wotan intervenes, causes Siegmund to be slain and then slays Hunding himself. Brünnhilde carries to safety Siegmund's sister-wife, Sieglinde (soprano), to whom she gives the fragments of Siegmund's sword. Brünnhilde is made a mortal woman for her disobedience, and is put to sleep surrounded by a wall of magic fire and destined to become the wife of the first man brave enough to break through the fire and so awaken her.

The final act ranks as one of the most sublime in all music with its well-known 'Ride of the Valkyries', 'Wotan's Farewell', and the 'Magic Fire Spell'.

'THE LOVE OF THREE KINGS'



In this final scene of Montemezzi's tragic opera, 'The Love of Three Kings', Fiora, the heroine, lies in death, choked by the blind king at left.

First produced in Munich, 1870. German. Three Acts.

Siegfried (*sēg'frēd*). His mother, Sieglinde, dying at his birth, Siegfried (tenor) is raised by the dwarf Mimi. He becomes a magnificent hero. From the fragments of his father's sword he forges a mighty weapon. With it he kills Fafner the giant who has made himself into a fierce dragon to protect the magic ring and Rhine gold. He also kills Mimi. Licking a drop of the dragon's blood he is suddenly able to understand the birds, and one leads him to Brünnhilde (mezzo soprano) whom he wakens and loves. In the meantime, he has met Wotan and fearlessly broken Wotan's spear. The rule of the gods is about over.

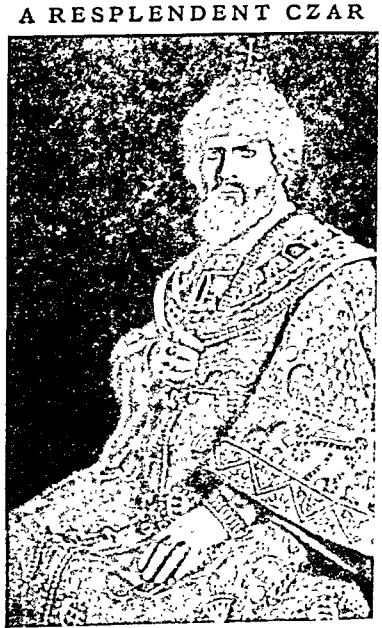
Produced Bayreuth, 1876. German. Three Acts.

Götterdämmerung (*gû-tĕr-dĕm'mĕr-ung*) (The Dusk of the Gods). Siegfried gives his magic ring to Brünnhilde, lovingly bids her farewell, and goes into the world. There Hagen, son of the dwarf Alberich, gives him a magic drink, which causes him to forget Brünnhilde and fall in love with Gutrune, sister of King Gunther. He agrees to bring Brünnhilde to the king for wife. Another drink causes him to remember, just before he is killed by Hagen. Brünnhilde learns of the drinks and forgives Siegfried. She has a huge pyre built for his body and, with the ring on her finger, rides into the flames. The Rhine overflows and the Rhine maidens seize the ring triumphantly. Valhalla is shown in flames. The world of the gods has passed and through the sacrifice of Brünnhilde, the finer era of love begins.

Contains some of Wagner's mightiest music, notably Siegfried's 'Journey to the Rhine', his 'Funeral March' and Brünnhilde's 'Immolation'. Presented Bayreuth, 1876. German. Three Acts.

Romeo and Juliet. The libretto is based upon Shakespeare's drama of the same name (*see* Romeo and Juliet). Juliet's gay 'Waltz Song', Act I, is best-known aria. Music by Gounod. Produced Paris, 1867. Five Acts.

A RESPLENDENT CZAR



The great Russian dramatic basso Feodor Chaliapin as Boris Godunov in Moussorgsky's opera of that name.

Der Rosenkavalier (*dĕr rōz'ĕn-kä'vā lēr*). The story, depicting the loose morals typical of 18th-century Vienna, concerns the successful efforts of the young Count Octavian (mezzo soprano) to win Sophie (soprano), daughter of the newly rich Faninal (barytone). He exposes the vulgar old Baron Ochs of Lerchenan (bass) to whom Faninal was trying to marry Sophie.

Libretto by Hugo von Hofmannsthal. Music by Richard Strauss is rich in orchestration and waltz melodies. Produced Dresden, 1911. German. Three Acts.

Samson and Delilah. Samson (tenor), Hebrew leader of gigantic strength, is ensnared by Delilah (mezzo soprano). She delivers him into the hands of the Philistines. In Act III he appears shorn, blinded, and chained, treading a mill, praying God for mercy in *Vois ma misère, hélas.* He is led in shame before the feasting Philistines, but praying for strength, seizes the marble pillars and overthrows the whole temple.

Best-known selections are Delilah's *Printemps qui commence*, Act I; *Mon coeur s'ouvre à ta voix* (Delilah), Act II; and the 'Bacchanale', Act III.

Music by Saint-Saëns. First produced in Weimar, Germany, 1877. French. Three Acts.

Tales of Hoffmann. Opens with a prologue, the poet Hoffmann agreeing to tell a group of tavern companions of his three great loves. Story of loves forms the next three acts. All are frustrated by an evil genius that follows him. The first girl is an automaton, the second a mocking coquette, the third a dying consumptive. In the epilogue he is left alone, only the poetic Muse remaining faithful.

The 'Barcarolle', Act III, is extremely popular. Music by Offenbach. Produced Paris, 1881. French. Three Acts.

Tannhäuser (*tän'hoi-zĕr*). The minstrel knight, Tannhäuser (tenor), has been enticed into the Venusberg, but he wearies of the lewd pleasures of Venus and returns home. There he is reunited with his old sweetheart Elizabeth (soprano) and old friend and rival Wolfram (barytone). But after singing the praises of sensuous love, he is banished, and remorsefully goes on a pilgrimage to Rome. In the end his soul is saved by prayers of Elizabeth and he falls dying on her bier.

Best-known selections are: the 'Overture', the 'Venusberg Music' and 'Bacchanale', Act I; Elizabeth's *Dich, teure Halle*, and the 'March', Act II; 'Pilgrims' Chorus', Elizabeth's 'Prayer' and Wolfram's song to the Evening Star, *O, du mein holder*, Act III.

Music and text by Wagner. Produced Dresden, 1845. German. Three Acts. One of Wagner's early works, written before he abandoned the old opera form.

Thaïs (*tä-ēs'*). The lovely actress and courtesan, Thaïs (soprano), is converted by the monk, Athanaël (barytone).

But in converting her the monk himself has fallen from grace. In the final scene as the repentant Thaïs lies dying in the convent, Athanaël comes, imploring her to fly with him to Alexandria. He sinks in despair at her deathbed.

The beautiful 'Intermezzo', or 'Meditation', symbolizing the conversion of Thaïs, is the most popular selection.

Music by Massenet; text based upon Anatole France's novel. Produced Paris, 1894. French. Three Acts.

La Tosca. Floria Tosca, a singer (soprano), and Mario Cavaradossi, a painter (tenor), are lovers. Mario, by concealing a revolutionist friend, has come into the power of the malicious Scarpia (barytone), chief of police. Scarpia promises to make the execution of Mario only a sham affair if Tosca will give him her love. She agrees, but stabs him as he advances to her. The execution of Mario is real. Desperate, Tosca jumps over the parapet to her death just as the police arrive to arrest her for murdering Scarpia. The most popular selections are: *Recondita armonia* (Mario), Act I; *Vissi d'arte* (Tosca), Act II; *E lucevan le stelle* (Mario), Act III.

Music by Puccini; text based upon drama by Sardou. Produced Rome, 1900. Italian. Three Acts.

La Traviata (*lä trä-vē-ä'tä*). At a gay party at her salon in Paris, Violetta Valery (soprano), a beautiful woman of loose reputation, meets Alfredo Germont (tenor). They fall deeply in love and are living happily together when Alfredo's father Giorgio (barytone) intervenes, imploring Violetta to give up Alfredo for the sake of his family's reputation. She makes the sacrifice, Alfredo believing her to be false. He does not learn the truth until it is too late. She dies of consumption in the presence of father and son.

EMMA CALVÉ



This noted singer's playing of Carmen was one of opera's great successes.

A favorite opera of coloratura sopranos. Well known are *Libiam nei lieti calici* (Violetta, Alfredo, and chorus), *Ah fors' è lui* and *Sempre libera* (Violetta), Act I; *Di Provenza il mar* (Giorgio), Act II; *Addio del passato* (Violetta), *Parigi, o cara* (Violetta and Alfredo), Act III.

Music by Verdi. Text by Piave, founded on Dumas' 'La Dame aux Camélias'. First production Venice, 1853. Italian. Three Acts.

Tristan und Isolde. Tristan (tenor) is conducting the Irish princess Isolde (soprano) to Cornwall to be the wife of his uncle, King Mark. Isolde, imagining Tristan is indifferent to her, prepares a cup of poison and invites him to drink. They both drink, but Isolde's maid, Brangäne (mezzo soprano) substitutes a love potion for the poison and the two fall under an irresistible spell. When King Mark comes upon the two making love (Isolde is now the King's wife), Tristan is wounded by one of the King's knights. He is carried to his castle in Brittany and there he pines for Isolde. She comes at last just as he dies. She sings the glorious 'Love Death' and dies too.

Generally conceded the greatest love music in existence. The 'Prelude' and 'Love Death' are in the repertoire of most great symphony orchestras.

GREATEST OF THE GREAT



The famous Enrico Caruso, tenor, as Canio in 'I Pagliacci', a rôle with which his name will always be associated.

Words and music by Wagner. Produced Munich, 1865. German. Three Acts.

Il Trovatore (*ēl trō-vä-tō'rā*) (The Troubadour). The complicated plot concerns Manrico, the troubadour (tenor) who has been brought up by Azucena, a gipsy (contralto), as her son. In reality he is the brother of the Count di Luna (barytone). Azucena stole him as a child to avenge her mother's death. Both the Count and Manrico are in love with Leonora (soprano). Finally the Count has Manrico imprisoned with his supposed mother. Leonora offers to marry the Count if he will free Manrico. The Count agrees, but Leonora takes poison and dies in Manrico's arms. The enraged Count has Manrico put to death while Azucena, avenged at last, cries, "You have killed your brother."

Extremely popular. The final act, perhaps the best known of any in opera, includes: *D'amor' sull' ali rosee* (Leonora); 'Miserere' (choir) and Manrico's *Ah, chè la morte; Ai nostri monti* (Manrico and Azucena). Also popular are *Tacca la notte placida* (Leonora), Act I; the 'Anvil Chorus', and *Stride la vampa* (Azucena), Act II; *Di quella pira* (Manrico), Act III.

Music by Verdi. Produced Rome, 1853. Italian. Four Acts.

The Origin and History of Light Opera

LIGHT OPERA is the general term for an opera or dramatic work which contains the four elements of merriment, poetry, music, and drama. As taste in music and humor has developed or changed, light opera has included *intermezzo, opera buffa* (Italian), *vaudeville, comédie à ariettes, opéra bouffe* (French), *Singspiel, waltz opera, ballad opera, lyric opera, English burlesque, comic opera,* and *musical comedy* The distinction between these various forms is not always clearly marked.

As a rule, the music of light opera is more "popular" in style than that of serious opera, and it appeals to a wider audience because it is usually easier to perform and to comprehend. In its most highly developed form, however, its performance calls for skilled musicians.

The beginnings of light opera may be found in the early Greek chorus. Because people have always liked gaiety, the comic chorus developed. The chorus numbers of the Greek music-comedies were sung either to traditional airs or to tunes which had recently achieved popularity. This method was the same as that adopted over two thousand years later in the early French *comédie à ariettes*, the English ballad opera, and the German *Singspiel*.

There is no evidence that the Romans made any contribution to the development of light opera, excepting that pantomime and dancing were very popular and that theaters were greatly improved in the days preceding the Dark Ages. The later development of light opera stems from two sources: the sacred, associated with the gradual development of religious music, and the profane, associated with those country revels which had lived through all the centuries of darkness.

Light Opera in Italy

In Italy, with the Renaissance, carnival processions were held in the streets of towns and villages. The carnival spirit led to the introduction of dramatic episodes accompanied by singing, and helped to develop the Italian love of music and fun.

In the 17th century, when serious opera came into favor, managers found that the public wanted humor, and included, between the acts, little comic scenes known as intermezzi.

The earliest independent intermezzo of which performance is recorded is 'Che soffre speri' (1639), by Mazzochi and Marazzoli. This may be considered the beginning of the joyous opera buffa, where songs, duets, and choruses were joined together by a thread of light and incidental narrative (recitative).

A BALLAD OPERA OF THE 17TH CENTURY



This scene is from a modern presentation of the earliest English ballad opera, 'Beggar's Opera' (1728). Its piquant music, lyrics, and characterization are still enjoyed.

In the 18th century, opera buffa in the Neapolitan dialect became the vogue. A charming example of this style, Pergolesi's 'La Serva Padrona' (1733), is still produced occasionally. An opera buffa of the late 18th century still performed is Cimarosa's 'Il Matrimonio Segreto' (1792).

By the 19th century, the easy graces of the Neapolitan school had begun to grow antiquated, and Gioacchino Rossini provided the stimulant needed after the long reign of Neapolitan opera buffa and intermezzo. He wrote several operettas, the opera buffa 'L'Italiene in Algeri' (1813), and the classical opera buffa 'The Barber of Seville' (1816). The latter was a failure at first, but by its brilliance soon won a place in public favor. *Donizetti too* produced opera buffa of a high standard, such as 'The Daughter of the Regiment' (1840). After Rossini and Donizetti, opera buffa began to decline in favor. But it led indirectly to a work of true genius, 'Falstaff' (1893), composed by Verdi at the age of 80. It may be styled a classical comic opera.

The 20th century does not find the story of Italian light opera ended. There have been excursions into the realms of comedy by several modern composers, notably Puccini, in his one-act operetta, 'Gianni Schicchi' (1918). Wolf-Ferrari, in his operettas, recaptures something of the delicacy which characterized opera buffa at the beginning of the 18th century. Best known is his 'Il Segreto di Susanna' (1909).

Because of their musical excellence, many examples of opera buffa are included in present-day grand opera repertoire. They are remarkable for the liveliness and humor of their action, and for the pointed comic characterization in their music. Attempts to imitate them have profoundly affected the music of France, England, and America.

History and Development in France

The origin of light opera in France may be found in the 12th- and 13th-century mystery and morality plays, which were forerunners of *jeux* or merry plays.

Adam de la Halle, the most notable among the *trouvères* and troubadours, is sometimes called the father of French operetta. The best known of his compositions was 'Le Jeu de Robin et de Marion', produced in Naples in 1285. Unfortunately, the taste of the Middle Ages preferred coarse comedy to dainty sentiment, and this prevented De la Halle from establishing a pastoral school. However, through the efforts of the trouvères and troubadours, poetry, merriment, and music took a firm hold on the imagination of the people, as these minstrels performed in noble houses at weddings and feasts.

The French religious fairs held in Paris, beginning in the 12th century, drew large crowds of people who came to honor the relics of the saints in the various churches. By the 16th century, entertainment had come to be a part of these fairs. There was great rivalry between them and the regular Paris theaters. The theater proprietors succeeded for a time in having the fair managers forbidden by law to present musical entertainment of a comic nature.

During the early 18th century, however, certain fair performers obtained permission to sing and dance as they wished. In this connection the words "opéra" and "comique" were first used in conjunction. The phrase was intended to mean *opéra rendu comique* ("opera made comical"), for it was the original intention to take serious works and turn them to ridicule. The public had become bored with ultra-serious opera.

In 1752 an Italian company conquered Paris with a repertoire of the intermezzo type, including Pergolesi's 'La Serva Padrona'. To avert ruin, a fair group presented what was claimed to be a new Italian work, 'Les Trocqueurs', which was actually the work of a Frenchman. It became very popular, proving that France as well as Italy could produce comedy music. Other such works followed enriched with original songs called *ariettes*, meaning "little arias." With these variations, opéra comique rapidly grew into general favor. Toward the close of the century a theatrical organization called "L'Opéra Comique" was formed in Paris, which built its own theater of the same name, and had its own actors.

COMIC OPERA OF THE 19TH CENTURY



Characters from the 'Pirates of Penzance' (1880). The operatic works of Gilbert and Sullivan are a direct link between ballad opera and modern operetta.

During the 19th century, however, this organization came to take itself too seriously for general popularity. The pieces it now performed were not comic at all and differed from grand opera only in having some spoken dialogue. Again there was a revolt, and French opéra bouffe or operetta came into vogue. It may be defined as light opéra comique, but it was considered too light in its comedy for performance by the artists of L'Opéra Comique. Jacques Offenbach, the best known among the composers of opéra bouffe, was therefore compelled to open his own theater to obtain hearings for his works. The public loved Offenbach's music, which combined sentiment with joyousness and was filled with melody and sparkle, rhythm, and humor. His operettas became popular, not only in France, but in Austria, England, and America. Some of the most popular of Offenbach's works are 'La Belle Hélène' (1864), 'La Vie Parisienne' (1866), 'Barbe Bleu' (1866), and 'The Tales of Hoffmann' (posthumously 1881), the last of which is the most famous and has taken an honored place in grand opera repertoire. It is really light grand opera. Excerpts from Offenbach's operettas are available on records and are often heard on radio programs. Other composers of operetta included Hervé who preceded Offenbach, Lacombe, Lecocq, Audran, Planquette, and Chassaigne.

The late 19th and early 20th centuries found opéra bouffe dividing into two fields: the humorous, which led to *revue* and vaudeville, and the sentimental, which developed into the delicate refinement of André Messager. The revues of this period are very light and without lasting qualities. Messager represents the fusion of operetta with opéra comique. In all, he wrote about 20 operettas and operas. His greatest success was 'Les P'tites Michu' (1894). He was followed by Bruneau, Dukas, Rabaud, Hahn, Ravel, and several others whose work was of a more serious musical character.

20TH-CENTURY OPERETTA



The 'Merry Widow' is the type of waltz opera in which the romantic love theme has become dominant. Comedy is used for relief.

Light Opera in German Hands

In Germany, the Minnesingers and the Meistersingers cultivated a national taste for music, preparing the way for the coming of the *Singspiel* or songplay which was the commencement of German light opera.

In the 18th century, Johann Adam Hiller created the Singspiel. This was a kind of vaudeville consisting of spoken dialogue interspersed with songs. His principal works, 'Der Dorfbarbier' (1771) and 'Die Jagd' (1771) may still be heard occasionally.

The Singspiel retained a hold on the affections of the public until, in the late 18th century, Mozart created the classical Singspiel. While the 18th-century Italian light operas had concentrated on the music without much concern for

the libretto or story, the German light operas had concentrated on the dialogue to which the music was incidental. Mozart restored the balance between the two, and thereby revolutionized the history of light opera. 'The Marriage of Figaro' (1786) is said to be the perfect comic opera, 'Cosi fan Tutte' (1790) the perfect musical comedy, 'Il Seraglio' (1782) the perfect comedy opera, and 'The Magic Flute' (1791) the perfect fairy-allegory.

During the 19th century, the romantic school of opera arose, and, while usually concerned with somewhat somber themes, the group produced some light works, notably 'Fidelio' (1805) by Beethoven, and 'Der Freischütz' (1821) by Carl von Weber.

Following this, comedy opera known as *Spiel-Oper* was very popular. Best known of these are 'Nachtlager von Granada' (1834) by Kreutzer, 'Lustigen Weiber von Windsor' (1847) by Nicolai, and 'Martha' (1847) by Flotow. Wagner's music dramas are, for the most part, serious, but 'Die Meistersinger von Nürnberg' (1868) is a great comic work.

THE MODERN AMERICAN LIGHT OPERAS



Both of these light operas draw their materials from American life, 'Oklahoma' (1943) pictured at the top, has the color and charm of a play written around definite folkways, although its music is cosmopolitan. 'Porgy and Bess' (1935), pictured at the bottom, is an opera of southern Negro life. Its music reflects the Negro idiom.

Famous Austrian Light Operas

In Vienna during the 19th century, the *waltz opera* had its origin. Johann Strauss the first created the waltz and Johann the second created waltz opera, a combination of dancing with the French opéra bouffe. The best-known works of the younger Strauss, besides his many waltzes, are 'Die Fledermaus' (1827), 'Cagliostro' (1875), and 'Der Ziegeuner-baron' (1885). One of the most popular comic operas of the 19th century was Smetana's 'The Bartered Bride' (1866), which is still revived from time to time.

The popularity of the waltz opera continued into the 20th century, and great successes were achieved by Franz Lehar's 'The Merry Widow' (1905) and 'Ziegeuner-Liebe', Oskar Straus's 'The Waltz Dream' (1906) and 'The Chocolate Soldier' (1908). Richard Strauss, in 'Der Rosenkavalier' (1911) developed classical waltz opera. This composition which has an abundance of charming waltz themes, is included in grand opera repertoire today.

English Types of Light Opera

In England the bards and minstrels fostered the love of music. The minstrel lay, the madrigal, and the masque may be considered the three steps in musical development which contributed the ingredients of *ballad opera*.

During the 18th century, Italian opera was extremely popular in England, and the ballad opera was the English reaction to it. This art form became firmly established with the 'Beggar's Opera' (1728), which contained a vein of political satire and in addition was intended to burlesque Italian opera. The tunes were chosen from the great store of English, Irish, and Scottish melodies already existing. It was followed by a number of other ballad operas, and soon these began to use newly composed music. Among the best known of the composers were Dr. Thomas Arne ('Love in a Village', 1762), Charles Dibdin ('The Waterman', 1774), William Shield ('Rosina', 1783), and Stephen Storace ('The Haunted Tower', 1789).

In the 19th century, Sir Henry Bishop early raised the standards of ballad opera with his charming works. It gradually became more sentimental and developed into popular *lyric* or *romantic* opera with 'The Bohemian Girl' (1843) by Balfe and 'Lily of Killarney' (1862) by Julius Benedict.

From 1831 to 1885, *burlesques* led in popularity. Most of them were travesties of serious musical works. At first they were trivial one-act performances. But some were the work of genuine humorists with excellent literary quality.

After 1885 these performances became longer and more elaborate. Music was written especially for them, they were lavishly costumed, and dancing became a prominent feature. Here, then, were the beginnings of modern musical comedy.

Before this transition, however, Gilbert and Sullivan created out of burlesque a new trend, that of English *comic opera*, which commenced with 'Trial by Jury' in 1875. The next 12 years were marked by an unbroken sequence of sparkling, tuneful Gilbert and Sullivan productions, including 'The Sorcerer' (1877), 'H. M. S. Pinafore' (1878), 'Pirates of Penzance' (1879), 'Patience' (1881), 'Iolanthe' (1882), 'Princess Ida' (1884), 'The Mikado' (1885), 'Ruddigore' (1887), 'The Yeomen of the Guard' (1888), and 'The Gondoliers' (1889). Because of the high quality of both lyrics and music, these hold a unique place in light opera. To this day their popularity continues. (*See also* Gilbert and Sullivan.)

The 20th century saw the beginnings of the romantic type of musical drama which has since dominated light opera in England. It consists of a combination of the most effective points in ballad and comic opera. The new movement actually commenced with Sullivan's 'Ivanhoe' (1891). Other writers in this field have been Sir Charles Stanford, Ivan Caryll, P. M. Faraday, Liza Lehmann, and Ralph Vaughan Williams.

Light Opera in America

According to the records, the first performance of this type given in New York was the 'Beggar's Opera', in 1750. This was sufficiently popular to encourage the importation of other ballad operas during the next 75 years with performances given in New York City, Philadelphia, and Boston. In the 19th century the English importations began to be supplemented with French operettas and Viennese waltz operas.

Reginald de Koven (1859–1920) may lay claim to having been the first American operatic composer of importance. He wrote two romantic music dramas, 'The Canterbury Pilgrims' and 'Rip van Winkle', in addition to 19 light operas. His outstanding successes were 'Robin Hood', 'Rob Roy', 'Don Quixote', 'Tzigane', 'The Highwayman', and 'The Student King'.

Victor Herbert composed at least 35 light operas. Most of them were tuneful, but lacked enduring flavor. Among the best of his works were 'The Wizard of the Nile', 'The Idol's Eye', 'Prince Ananias', 'Naughty Marietta', 'The Red Mill', 'The Fortune Teller', and 'The Singing Girl' (*see* Herbert).

Sigmund Romberg (1887–1951) was born in Hungary. His first work given in New York was 'The Midnight Girl' (1913). 'The Student Prince' was produced in 1924 in collaboration with Karl Hajox, followed by 'The Desert Song', 'Maytime', and others.

Rudolf Friml (born 1881) was born in Prague. At 19 he came to America. 'The Firefly' was his first work, produced in 1912. It was followed by 'The Ballet Girl', 'Katinka', 'The Peasant Girl', 'Kitty Darlin' ', and the sensational success 'Rose Marie'.

Jerome Kern (1885–1945), born in New York City, produced many operetta scores marked by pleasing melody and tasteful style, among which the most outstanding were 'Sally', 'Sunny', 'Show Boat', 'Music in the Air', and 'Roberta'.

George Gershwin was one of the most talented pioneers in the creation of music with jazz idiom as a basis. 'Of Thee I Sing' (1931) was his greatest musical comedy success (*see* Gershwin).

'Oklahoma!' which was opened in 1943, and 'South Pacific', staged in 1949, were memorable successes with lyrics by Oscar Hammerstein II and music by Richard Rodgers.

The preparation of elaborate motion-picture versions of the more popular light operas has brought them to millions who would never see them on the stage.

Opium. Chief of the narcotic drugs which have both helped and harmed mankind is opium, the dried juice from the seed pod of the opium poppy (*Papaver somniferum*). Used as medicine, opium deadens pain. When it is used for its pleasurable effects, it saps energy and mental strength and forms a habit which can be broken only with the greatest difficulty.

Opium poppies, with their fragile flowers of red or white or purple, thrive in a hot climate but cannot endure heavy rain. Since each plant yields but little juice and since the fields must be weeded often, the poppies can be grown profitably only where land and labor are cheap, as in Asia and in the Balkans. After the poppies bloom, laborers—chiefly women and children—tediously collect the milky juice from the seed pods. Opium poppies grow chiefly in China, India, Iran, Turkey, and Soviet Russia. Much of it is sent to Europe and the United States, where it is manufactured into opiates for medicinal use—morphine, laudanum, and codeine. Japan, once a large manufacturer, was forbidden after the second World War to produce opiates.

HARVESTING OPIUM IN CHINA



The children are slitting the pods of the poppy blossoms that have shed their petals, and the woman is collecting the juice that flows from the pods with a suction tube. In the older method of harvesting, the juice is allowed to dry on the pod after it flows out of the cuts, and is scraped off the next day.

Opium smoking and eating have long been grave problems in the Orient. In India the government permits the moderate use of opium, but prohibits exports except for medical use. Japan has long banned use of the drug, but produced it in the puppet state of Manchukuo as a government monopoly. China has often tried to abolish opium smoking by banning the growing of the opium poppy. It fought the "Opium War" with Great Britain (1839–42) to stop British imports of the drug from India, but was defeated and forced to permit smuggling. In 1935 the Chinese government took over the control of opium and established cure centers.

Ancient peoples used opium medicinally as early as the days of the Assyrians. In the Middle Ages Arabs introduced it into India and China, and its use spread into Europe. In the 18th and 19th centuries, almost all "pain killer" medicines contained opiates. When the people of the United States came to realize the habit-forming property of these medicines, state and federal laws were enacted to drive them off the market. Physicians now prescribe opiates only to relieve pain and to bring needed sleep (*see* Drugs; Narcotics).

The first international opium conference met at Shanghai in 1909. Later conferences at The Hague in 1912 and at Geneva in 1925 and 1931 resulted in treaties designed to regulate the opium trade. The United Nations Commission on Narcotic Drugs and two other international groups watch over lawful opium traffic and suggest measures for controlling all illegal trade. Despite these efforts, huge quantities are smuggled into many countries and sold to addicts.

OPOS'SUM. The peculiar way in which the opossum rears its young sets it apart from all other American animals. As many as a dozen may be born at a time, each about half an inch long. At once they crawl into a pouch on the mother's abdomen. There they fasten themselves to the milk glands and remain helpless for about six weeks. When they first come out of the pouch they are the size of mice. For some time after that they ride around on their mother's back, clinging to her fur and crawling back into her pouch to sleep.

This way of rearing the young is peculiar to the group of mammals called *marsupials* (from the Latin word *marsupium* for "pouch"), including kangaroos, wombats, "Tasmanian devils," and bandicoots. The opossums of North America and their relatives in South and Central America are the only marsupials now found outside the Australian region.

When full grown, the common opossum is about the size of a house cat (33 inches to the tip of the tail). The head is small, but has long narrow jaws set with 50 teeth. The feet are five-toed. Each toe on the forefoot has a long sharp nail that helps in climbing trees. Four toes on the hindfoot also have nails. The nailless first toe is used like a thumb to grasp branches. The tail, long and ratlike, also helps in climbing. There are two coats of fur; the inner coat is soft and short, and the outer is coarse, long, and a grizzled gray in color.

During the day the opossum sleeps in a burrow, brush pile, hollow log, or tree. At night it hunts in trees or on the ground. It grows fat from eating birds, frogs, fish, eggs, insects, and fruit. It climbs to the tips of branches to get cherries, mulberries, and persimmons. But its slowness makes it an easy prey of owls, wolves, coyotes, wildcats, foxes, and bears.

Hunting the opossum with dogs is a favorite sport in the South on autumn nights. When surprised by a hunter, the opossum pretends to be dead. From this trick has come the expression "playing 'possum." The flesh is enjoyed by some, and the fur is prized for making women's coats.

Range of common opossum (*Didelphis virginiana*): Florida to New York; Texas and the Great Lakes to Atlantic Coast. The Texas opossum, which is all black at certain seasons, is found in southern Texas. The Florida opossum, a slightly smaller variety, ranges from Florida to western Louisiana.

YOU SELDOM SEE HIM BY DAYLIGHT



The opossum usually sleeps in the daytime and does its hunting at night. Notice the long ratlike tail with which it can take hold of things.

ORANGE. Juicy, round, golden oranges are perhaps the best-liked fruit in the world. In America a large share of the people enjoy them daily. Infants, when only a few months old, are given this wholesome juice. Boys and girls carry oranges in school lunch boxes. Housewives find oranges in the market all year long. Thousands of people work at growing and distributing the nation's mammoth crop.

A century ago the orange was much less plentiful and familiar, though it had been cultivated for thousands of years. The tree grows only in the warm (tropical and subtropical) parts of the earth. Few people in the cooler regions were able to get oranges until the development of speedy transportation, refrigerator cars and ships, and cold storage (*see* Refrigeration).

ORANGE BLOSSOMS



Brides have traditionally chosen the fragrant, waxy-white flowers of the orange tree to wear at the marriage ceremony.

Demand for oranges increased greatly after people learned that the fruit was healthful as well as delicious. In the 1890's physicians found that people with scurvy could be cured by drinking the juice of oranges and related citrus fruits—lemons, limes, and grapefruit. Later, scientists discovered that the juice is beneficial because it is rich in vitamin C (*see* Food; Vitamins). It also contains some vitamin A, vitamin B_1, and certain of the minerals that the body needs. Though an orange is about 87 per cent water, its high sugar content gives it a calorie count of 70.

In the 20th century American consumption increased amazingly. During the 1909–10 season, some 17 million boxes of oranges (including tangerines) were grown and sold for about 18 million dollars. In 1950–51 growers sold 121 million boxes for about 234 million dollars.

Before the second World War, nearly all the crop was marketed as fresh fruit. In 1944 scientists worked out a method of concentrating the juice in a vacuum and freezing it without destroying its flavor and vitamin content. Soon the frozen juice became popular, and by the early 1950's about half the oranges sold went to processing plants. They pack canned juice, unfrozen concentrate, and marmalade, as well as frozen concentrate. By-products include dehydrated stock feed, pectin, citric acid, essential oils, molasses, and candied peel.

Where Oranges Grow

The United States produces more oranges than any other country. California and Florida yield 95 per cent of the output, and smaller crops come from Arizona, Texas, and Louisiana. California growers shipped the most fruit until frozen juice became popular. Then Florida moved ahead, since its processing plants pack most of the concentrate.

Brazil and Spain rank second and third among orange growing countries. Other countries with large yields include Italy, Japan, Argentina, Mexico, Palestine, Egypt, and Algeria.

The Fruit and Its History

Oranges grow on a handsome, symmetrical tree that reaches about 15 to 30 feet in height. Its leaves are evergreen and glossy and its waxy white blossoms have a heavy fragrance. The fruit is classed as a berry by botanists. Its orange-colored rind is tough on the outside and white and spongy inside. (For illustration in color, *see* Fruits.) Within are eight or more segments (*locules*) filled with a juicy pulp. Most oranges contain seeds. The seedless navel has small locules, like a tiny orange, at the spiral end.

The orange tree is believed to be a native of southern China or Burma, where it was cultivated as early as 1000 or 1500 B.C. The Arabs carried the fruit to Africa and Spain during 8th-century Moslem conquests. Crusaders brought seeds to Italy and southern France. Thus far Europe knew only the sour, or Seville, orange (*Citrus aurantium*). Later, Portuguese explorers brought from India the sweet orange (*Citrus sinensis*). It is the parent of most cultivated varieties. Spanish explorers brought the seed of both kinds to warm parts of the New World.

Florida's Spanish plantings had run wild by the time English-speaking settlers arrived. Orange-growing on a large scale began after railroads were built to the state. Modern groves are mainly in the warm central part. The heavy rainfall makes irrigation unnecessary. Florida's chief varieties are the Hamlin, Parson Brown, Homosassa, Pineapple, Ruby, Valencia Late, and Lue Gim Gong. Early and midseason varieties are picked from October through April, while Valencias go to market from February 1 to July 31.

Northern Florida and Louisiana also grow the hardier, loose-skinned mandarin oranges (*Citris nobilis*). The best-known mandarins are tangerines, Satsumas, Dancys, and Kings.

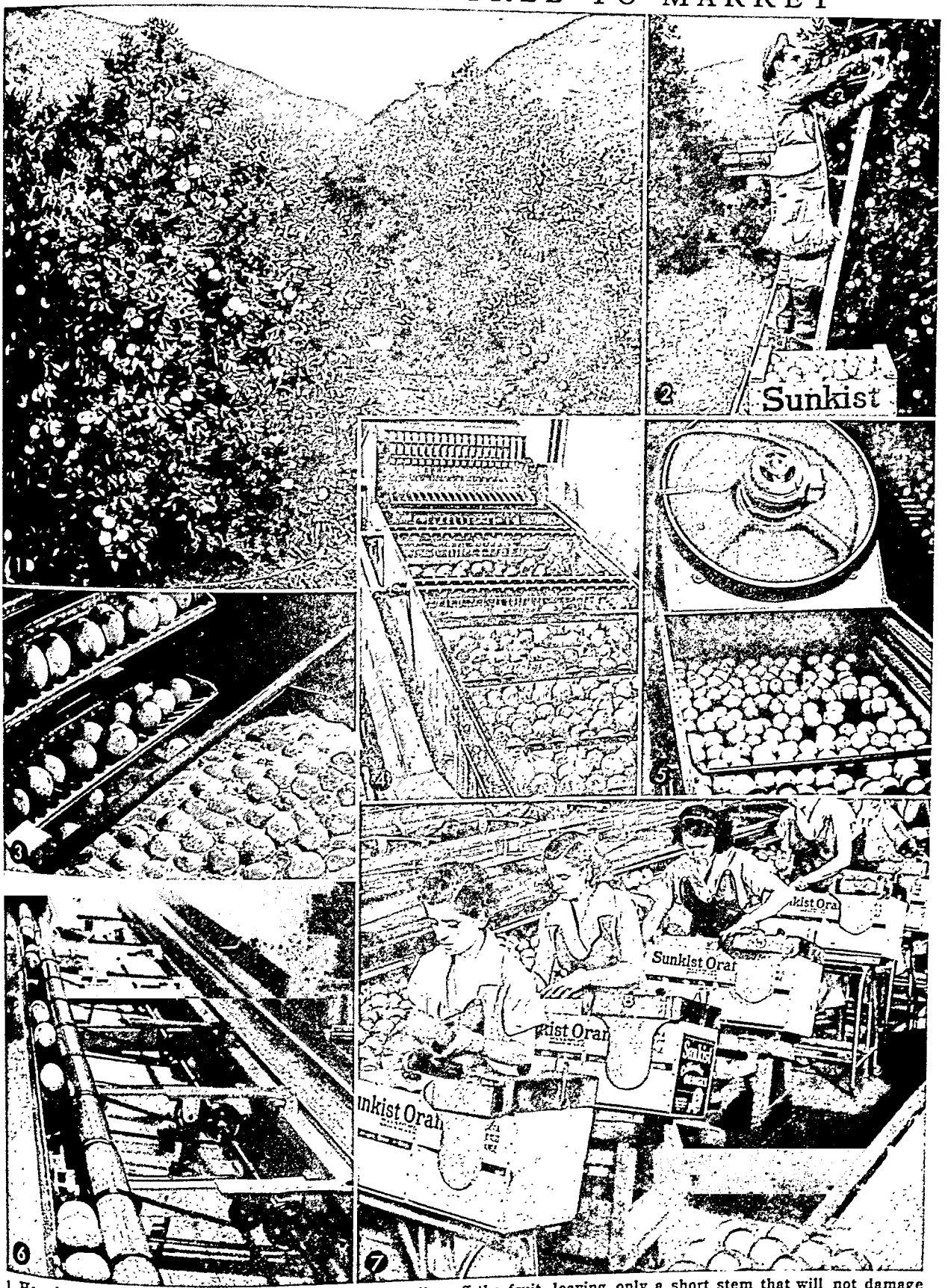
The first California orchards were planted at the old missions. The great expansion of commercial groves followed the first carload shipment to the East in 1877. The warm valleys of the Los Angeles area are the center of orange growing. Irrigation is needed.

The famous seedless Washington navel orange was developed in California after two trees bearing seedless fruit were brought from Bahia, Brazil, in 1873. The state's groves have a long bearing season. Navels are picked from November through May, and Valencias from March 1 to December 31.

Growing and Handling Oranges

Nurserymen prepare young trees for the grove by budding or grafting a stem bud of a desired variety on a rooted seedling of hardy stock. The trees are

ORANGES—FROM TREE TO MARKET



1. Here is a well-filled California tree. 2. The picker clips off the fruit, leaving only a short stem that will not damage other oranges in the picking bag or box. 3. At the packing unit, the oranges get a warm bath. 4. They are rinsed. 5. Warm air dries them. 6. They pass along a narrowing runway and drop into bins according to size. 7. Packers wrap them in tissue before boxing them. Like the pickers they wear canvas gloves to keep their fingernails from piercing the fruit.

planted in regular rows 25 or 30 feet apart. They need a soil rich in minerals and humus, so the ground is fertilized and a cover crop is harrowed into the soil.

Insect pests and fungus diseases attack the orchard. The grower must spray the trees with chemicals and fumigate with gases. Among the pests are various scale insects, the white fly, and the rust mite. The ladybird beetle was imported from Australia to eat scale insects. When frost threatens, growers fight it by lighting smudge fires in the groves or using a wind machine to blow away the blanket of freezing air.

Growers belong to co-operative packing and marketing associations. Their experts decide when a grove's crop is mature and send in a crew of pickers. Pickers are often migratory workers who move about as oranges and other fruits ripen. At packing centers, the fruit is washed, graded, sized, wrapped and boxed for shipping or sent in bulk to processing plants. If oranges look green after they mature, they may be gassed with ethylene to destroy the chlorophyll in the rind and bring out the orange color. Oranges may be waxed to retard shrinking during storage.

A YOUNG "MAN OF THE WOODS"



In general appearance the Orang utan is not as manlike as the gorilla, but the form of his head, particularly in the young ones, is more like that of man than either the Gorilla's or the Chimpanzee's.

ORANGE FREE STATE. Since 1910 the Orange Free State has been one of the four provinces of the Union of South Africa. The land between the Orange and Vaal rivers was settled about 1836 by Boer emigrants ("Voortrekkers") from the Cape of Good Hope. Although annexed by the British governor of the Cape in 1848, it achieved independence in 1854. Defeat in the Boer War (1899–1902) brought it again under British rule. (*See also* Boer War; South Africa.)

Most of the land is a gently rolling prairie—the high veld. Agriculture and mining are the chief industries. Area, 49,647 square miles; total population (1951 census, preliminary), 1,018,207. Bloemfontein (109,130) is the capital of the province.

ORANG UTAN. The name of this member of the ape family, found in the swampy forests of Borneo and Sumatra, comes from the Malay language and signifies "man of the woods." It is well named, for like the chimpanzee and the gorilla, it approaches closely to man in appearance and structure. A full-grown male occasionally reaches a height of four and a half feet, but the outstretched arms cover more than seven feet. The body is bulky and covered with long, reddish-brown hair. The legs are short, but the arms are so long as to reach the ankles when the animal is erect, and in walking the knuckles are placed on the ground. Orang utans, however, are awkward on the ground and prefer the trees, where they can travel at the rate of five or six miles an hour, without special effort, by swinging along on the branches, which they grasp mainly with their hands. They feed on fruits and succulent shoots, being strictly vegetarian in their diet. They get most of their food on the trees, but go to the ground for water. They live in pairs. As a rule they are peaceable, but when disturbed they are fierce fighters. They retire to rest at sundown in nests of broken boughs 20 or 30 feet above ground. In captivity they are teachable and the changing expression of the face makes them most interesting, though they are not so active and intelligent as the chimpanzee. Scientific name, *Simia satyrus*.

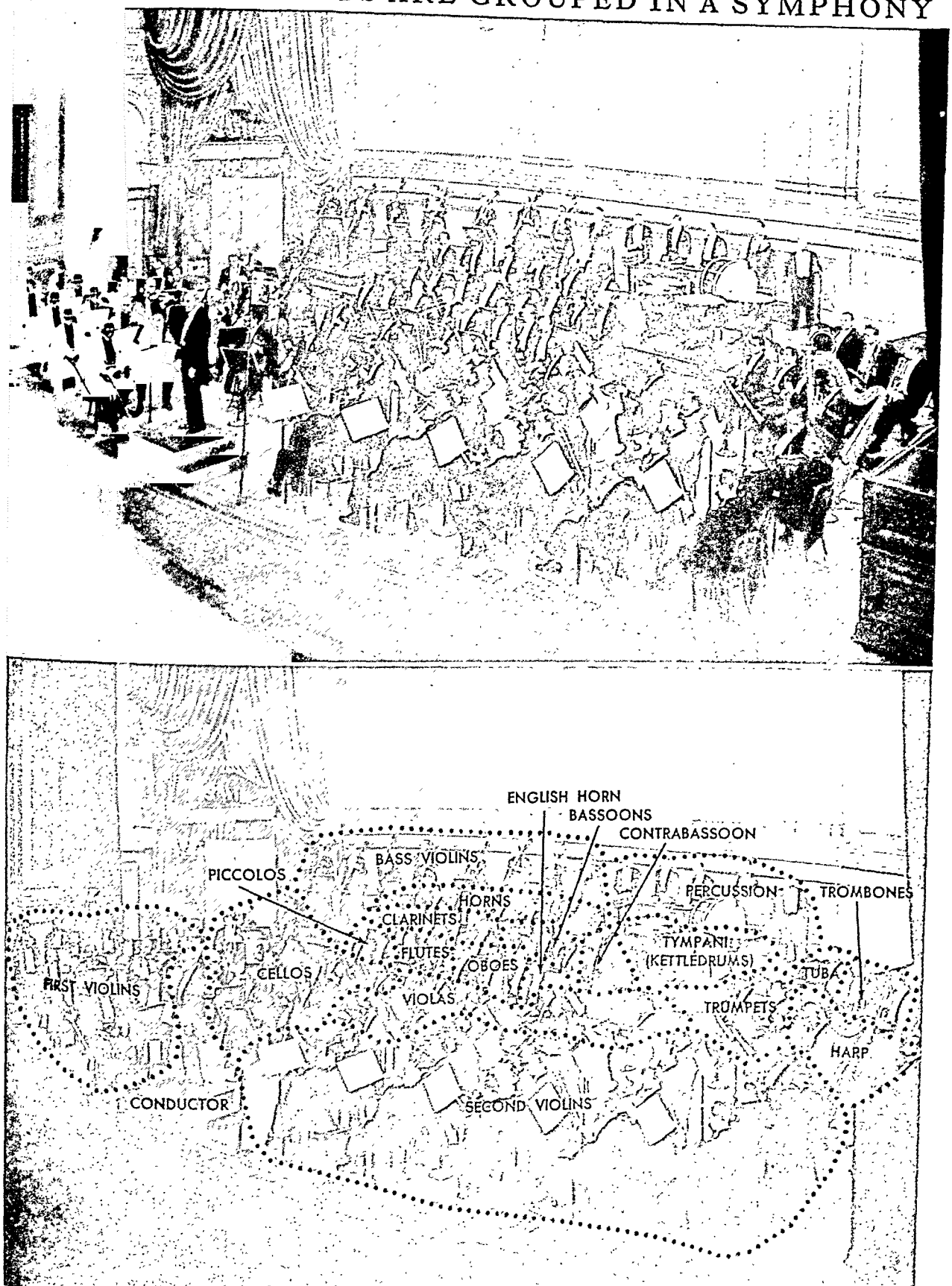
ORCHESTRA. When we watch a brass band, we see men playing horns and drums. When we look at a military band we see the same horn and drum groups, and with them a group of players using flutes and clarinets and other wood-wind instruments. When we listen to an orchestra we find, besides all these, still another and larger group playing stringed instruments.

This, then, is the difference between an orchestra and a band—that when we listen to an orchestra we really hear four "bands" in one! There is the *string* "band" made up of various members of the violin family, the *wood-wind* "band" made of all the wind instruments that are made of wood; the *brass* "band," with its various kinds of "horns"; and the noisy group of big and little drums, and all the other queer *percussion* instruments that are struck or beaten. All large orchestras also have one or more harps.

The "strings" form the foundation of the modern orchestra. They are capable of the greatest variety of expression in giving voice to the depths and heights of human emotion. The violins sing the soprano; the second violins the alto, the violas the tenor, the violoncellos (or "cellos") the baritone, and the double-basses (or bass viols) the bass (*see* Violin).

Next in importance is the wood-wind group, which is divided into three families. The first family consists of the flute, which with its clear sweet liquid

HOW INSTRUMENTS ARE GROUPED IN A SYMPHONY



Here is a typical arrangement of instruments in a symphony orchestra. No one standard arrangement prevails. The conductor may shift the instrument groups as he thinks necessary to give the most effective presentation of the particular composition. Generally most of the stringed instruments are in front, the woodwinds and brasses in the center, and the percussion instruments toward the rear. This is the Philharmonic-Symphony Society of New York ("New York Philharmonic").

TWO POPULAR MUSICAL GROUPS



A precision-marching Army band swings up Fifth Avenue in New York City. It provides a stirring march tempo for the whole parade. The drum major in front establishes the beat with his baton and holds a whistle in his mouth for blowing marching signals. Marching bands use only woodwinds, brasses, and percussion instruments. All instruments, of course, must be portable.



A favorite children's instrumental group is this double string quartet. At left are the first and second violins; in the center are the cellos; and at right are violins strung as violas. The first and second violins are three-quarter size, and the cellos are smaller than full size. The violins being played as violas are full size. The children are rehearsing for an elementary school entertainment.

notes is the most agile and flexible of the woods; and the piccolo, a shriller flute which has been called "the imp of the orchestra." The second includes the oboe, with its plaintive pastoral tone, and the deeper English horn and bassoon, which may be regarded as alto and bass oboes. The third comprises the clarinets, which are known by their full rich mellow tones. There are usually three of these of different pitch. Oboes and clarinets, as distinguished from the flute family, are reed instruments.

The "brasses" consist of the French horn, which is the old hunting horn adapted to orchestral purposes; the trumpet, with its full round brilliant tone (often replaced by the cornet); the majestic trombone, an instrument of great range and power, and the deep-toned tuba, the bass of the brass band (*see* Horn, Musical).

Of the percussion instruments, often called "the battery," some produce "noises" rather than definite musical notes. Such are the bass and snare drums, triangle, cymbals, etc., whose purpose is to accentuate the rhythm or add to the volume of sound, to help to produce various descriptive effects (*see* Drum). The kettle-drums, or *tympani*, however, which are among the most interesting instruments in the orchestra, can be tuned to sound certain notes. The bells, "glockenspiel," or "carillon," and the steel plates of the celesta likewise have a definite pitch.

What a marvelous thing an orchestra is! As someone has said: "It holds within itself nearly every kind of tone from the deepest rumble of the bass tuba and growl of the double-bass to the cool, flowing tone of the clarinet and bassoon and to the penetrating call of the flute, the cry of the violin, and the scream of the piccolo. It holds within itself every kind of vibration from bowed, or plucked, strings, and air blown upon quivering reeds, or through pipes, or tubes, or horns; it has every kind of thump on tightly stretched skin; it has every kind of rattle, clang, and clash; and every kind of sharp blow, from the heavy stroke on the steel rods to the silvery notes of bells, or the brilliant fiery sparks from the triangle."

A PAGE OF AN ORCHESTRAL SCORE



Great orchestral conductors often retain dozens of long scores in their memory, so that they need not watch the music during a concert but may give all their attention to the musicians. You can get some idea of what a task this is when you understand that each staff of the score represents the music for only one group of instruments.

Every instrument in the orchestra has been hundreds of years in developing to its present perfection (*see* Musical Instruments). So has the music it plays for us. Even the name "orchestra" comes to us from the Greek language of long ago. It meant the "dancing place" and the name came to be given to the instrument players because in the old Greek theater those players used to be placed in the circular space in front of the spectators, where the chorus danced and sang.

The early orchestras were very different from the great orchestras of today. About the time that the first white people came to live in America, the orchestras in Italy, which was then the chief home of music, had less than a score of instruments. One of the best remembered of these organizations had only seven — one harpsichord (the forerunner of the piano), one guitar, one viol, one lute, and three flutes. The great orchestra of the French conductor Berlioz, 200 years later, used 100 stringed instruments, 18 woodwinds, 49 brasses, 18 drums, three pairs of cymbals, and a gong! A modern symphony orchestra consists of from 60 to 100 musicians. A typical one is made up as follows: 16 first violins, 14 second violins, 10 violas, 10 violoncellos, 8 double-basses, 3 flutes, 2 oboes, 1 English

horn, 3 clarinets, 3 bassoons, 4 trumpets, 4 horns, 3 trombones, 2 tenor tubas, 2 bass tubas, 1 contrabass tuba, 2 pairs of kettledrums, bass drum, cymbals, harp, and celesta.

With so many instruments playing together it is very important to have a leader, or conductor, to indicate the time and to preserve the proper balance between the groups. You realize how complicated his task is when you look at the many lines of notes on each page of a conductor's score. Besides indicating the time and the expression the conductor also usually signals each solo player or group of players when they are to enter, if they have been silent for a few bars.

Almost every large city of Europe has at least one symphony orchestra, and there are scores of such organizations in the United States.

Orchid (*ôr'kĭd*). Fabulous prices have been paid for a single rare specimen of the remarkable orchid family of plants. These flowers are so exquisite in their delicate colorings of rose and lilac, yellow, white, and green, so pleasing in their violet or orris-root fragrance, and so graceful in many of their forms, that they have become the favorites of florists and all flower-loving folk. So great is the demand that thousands of dollars' worth of them are imported annually from South America, the East Indies, the Philippines, and even from Australia. Many an eager collector has climbed precipices, waded through malarial swamps, endured all dangers of tropical forests, and braved even the head-hunters of Borneo to get these treasured flowers. To prevent their total extinction some South American governments have put a stop to all orchid collecting.

Some orchids grow upon the ground as do so many of the other flowers, and some grow in wet marshy places and live on dead organic matter. The most valuable group are the air plants, which grow on tree trunks and branches in tropical and subtropical regions. They obtain their nourishment not from the support that some of their roots cling to but from their long spongy aerial roots which absorb the dust blowing around them as well as other food given by the moisture-laden atmosphere (*see* Air Plants).

Their flowers in color and form are often so close an imitation of queer bright-colored bees, butterflies, frogs, and lizards that the flower-destroying insects pass them by. All members of the family have various schemes for getting pollen-carrying insects to visit them. Inside the walls of the flower are tempting juices, but to reach them their insect visitor must first pass through the wonderfully constructed "lip," a conspicuously colored modified petal. These callers pay for their feast by carrying pollen masses away with them. Some orchids give their insect visitors a bath of nectar so as to make them crawl with wet wings up a certain path where they touch the pollen masses and stigma; some hurl their pollen masses at them, and others have various and no less remarkable devices to make sure that fertilization is properly carried out.

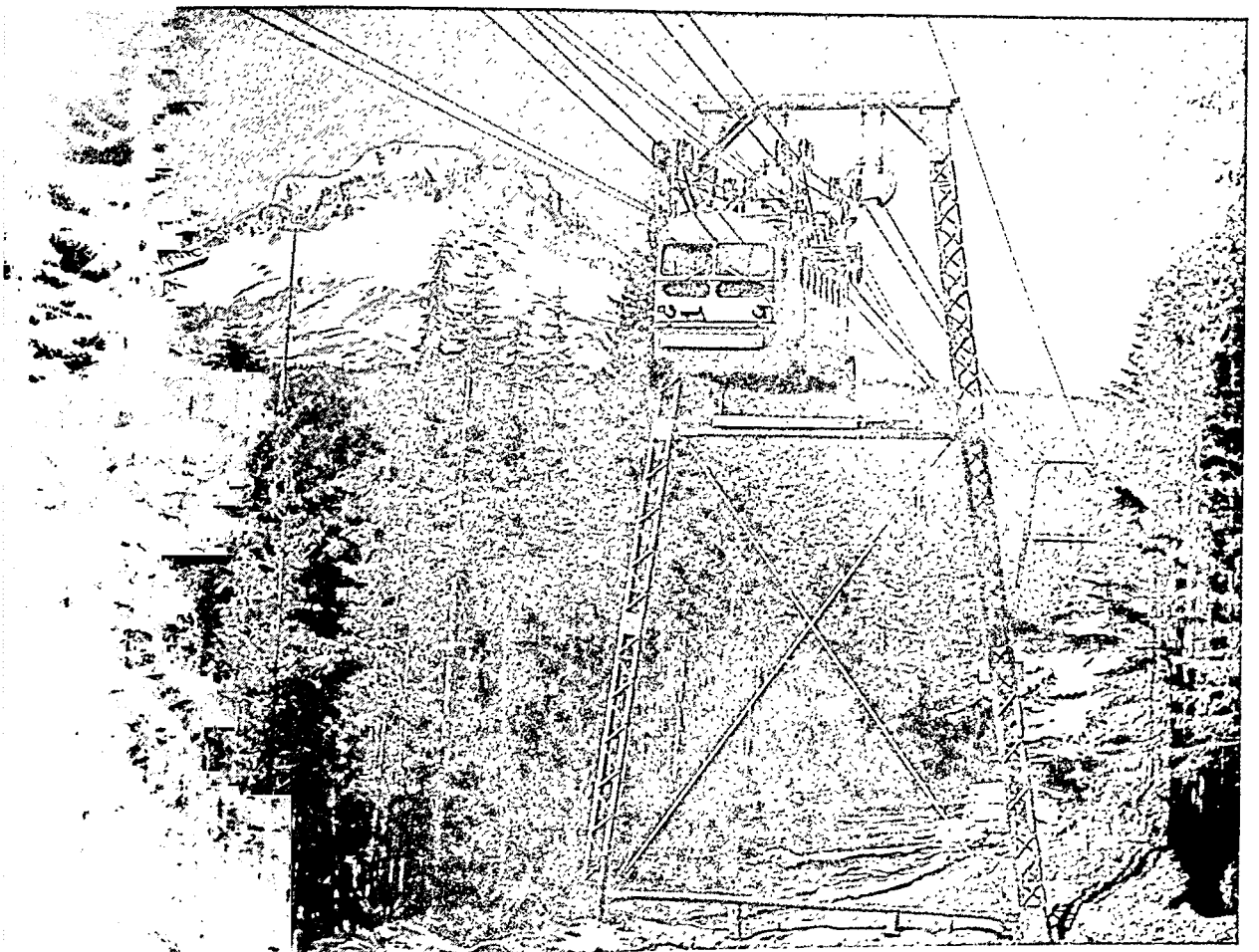
One species of orchid furnishes the vanilla of commercial use, and another the medicinal salep (*see* Vanilla). The orchids include not only the rare hothouse plants but certain more familiar species, such as those delicate and fragile wild flowers of our woods, the ladies tresses and the lady's-slippers. Among the latter, the showy lady's-slipper most closely resembles the orchid in appearance (*see* Lady's-Slipper).

There are more than 400 genera of the orchid family (*Orchidaceae*) and the number of species is estimated at more than 15,000. Fully 3,000 species are under cultivation. About 75 species are in the United States, including Alaska. Orchids thrive in all parts of the world where it is not too hot or too cold. They are divided into two general groups — the East Indian and the South American. Orchids are the most highly organized flowers among the monocotyledons. These perennial herbs have simple stems, often arising from bulbs; simple leaves; showy irregular flowers, with three beautifully colored sepals and three petals, one of which, the labellum, or "lip," is long, fringed, or saclike. The one or two stamens are united with the pistil, and the one-celled ovary contains about a million tiny ovules. The pollen is held together in masses by cobweblike threads.

FROM ORCHID SEED TO FLOWER TAKES MANY YEARS



The orchid seeds in the gardener's flask develop as shown in the flowerpots. The numbers indicate the age in years of each plant. Orchids usually bloom in the fourth to eighth year.



A Skiway Bus climbs 2,200 feet in the three-mile run from Government Camp to Timberline Lodge, halfway up the slope of Mount Hood. This is the world's longest aerial tramway. Beyond the evergreen forest in the background looms snow-capped Mount Hood.

GRANDEUR *and* OPPORTUNITY *in* OREGON

OREGON. For nearly half a century, the word "Oregon" was a call to adventure for Americans. At first it referred to the river (now called the Columbia) and the vast wilderness the river drained. Many fortunes were made. Sea captains obtained cargoes of fur pelts and traded them for silk and tea in China. Oregon was named the "Beaver State" for its rich yield of pelts for beaver hats.

In 1834 missionaries arrived and kindled interest back east in settlement of the area. By 1843 free land had drawn settlers over the Oregon Trail. For some years it seemed that Great Britain and the United States might war over the region. In 1846, however, the two nations divided the land. Congress established the territory of Oregon, and in 1859 admitted part of it to the Union as the present state.

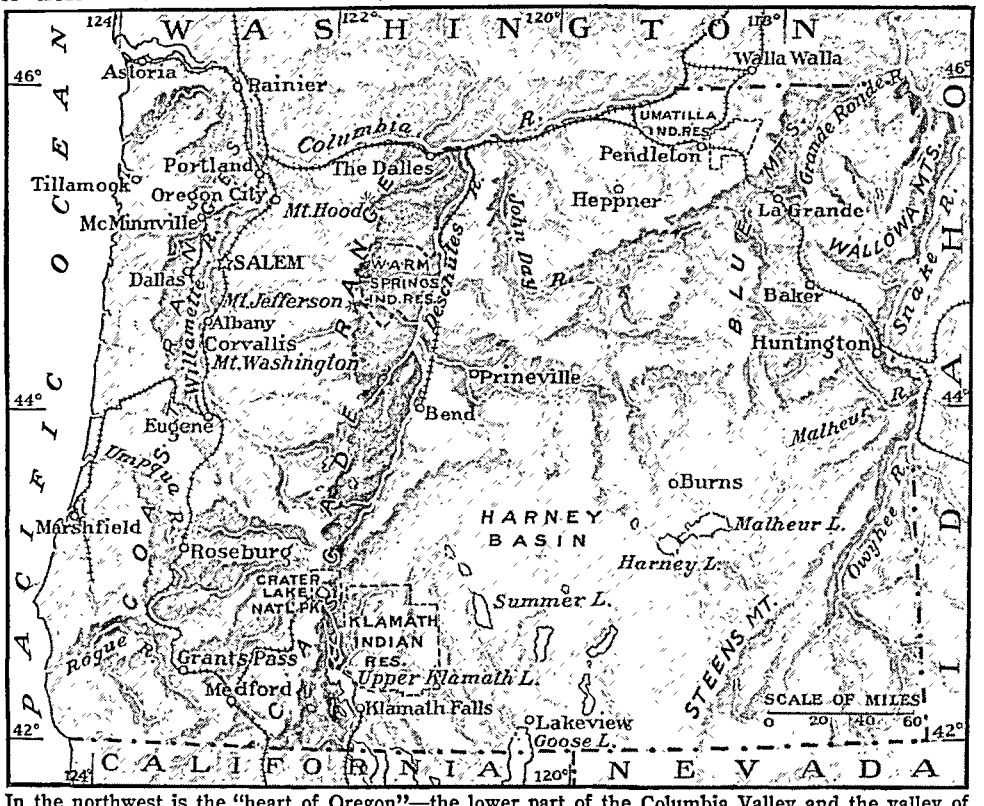
In a few years the settlers in the west had developed thriving farm communities. The spirit of adventure and some lawlessness, however, continued in mining camps and on eastern cattle ranges. Indian wars added excitement until the last struggle in 1880.

From all this emerged the Oregon of today, a state richly favored by nature and a land of man-made wonders. A playground in any season, it offers recreation as varied as its climate and land features. Along the long coast are many fine ocean beaches. The spiny back of the Cascade Mountains divides the state into two contrasting regions—plateaus, mountains, and lakes to the east, and valleys, Coast Range, and coastal plain to the west. At one end of the Cascades is perpetually snow-capped Mount Hood, and at the other end the deep blue waters of Crater Lake fill a volcano crater. In southwest Oregon nature carved the Oregon Caves in a mountain of marble, and in the northeast, lofty peaks rim Wallowa Lake.

The Snake River has cut the deepest gorge on the continent and the Columbia is famous for salmon. From the Columbia River Highway can be seen spectacular gorges. Bonneville Dam across the Columbia generates power for aluminum and chemical plants in the Portland area. This metropolis is a great port.

From the forests, mines, and farms come raw materials for important manufactures. Oregon cuts more lumber than any other state. It is one of the few states mining mercury and chromite. The western third grows a wide variety of crops and is famed for fruit growing. The eastern two thirds has wheat fields, cattle and sheep ranges, and irrigated lands.

A LAND OF MOUNTAINS, RICH VALLEYS, AND DRY PLATEAUS



In the northwest is the "heart of Oregon"—the lower part of the Columbia Valley and the valley of the Willamette. The Coast Range and the Cascades have ample rain, which makes it a highly productive region. South of the Willamette Valley is more rugged, forested land. East of the Cascades lies a vast plateau, broken by lakes and mountain ranges and receiving little rain.

As the Snake flows along Oregon's eastern boundary, it runs through awesome gorges of basalt until it enters the Columbia to the north in Washington State. Grand Canyon of the Snake River between the Wallowa Range in Oregon and the Seven Devils Mountains in Idaho is more than a mile deep. This long canyon is North America's deepest gorge.

The valley of the Columbia River along the northern border is much less rugged. It narrows where the river cuts through the Cascades west of Hood River. Here magnificent scenery can be viewed from the railroad at the river's edge or from the Columbia River Highway. Among the scenic high lights is Multnomah Falls. Near Portland, the Columbia receives the Willamette (*see* Columbia River).

Oregon has truly "grown up with the country." In 1859 it entered the Union with about 50,000 people. By 1940 the population was 1,089,684; and by 1950 it had increased another 40 per cent to 1,521,341.

The Varied Land

The eastern two thirds of Oregon is a rough, uneven plateau lying between 4,000 and 5,000 feet above sea level. The surface is broken by several mountain ranges, particularly the Blue and Wallowa ranges in the extreme northeast.

West of the plateau the Cascades rise to between 6,000 and 7,000 feet above sea level, with many peaks reaching higher. Several extinct volcanoes rise to 10,000 feet or more. Among the peaks are Mount Hood, Mount Jefferson, the Three Sisters, Mount Thielsen, Mount Scott, and Mount McLoughlin. In the southern part of the range is Crater Lake, one of the scenic wonders of the world. It occupies the widened crater of an extinct volcano (*see* Cascade Mountains; National Parks).

Toward the north, the Cascade Mountains fall off sharply to the valley of the Willamette River, less than 1,000 feet above sea level. West of the valley, the Coast Range rises to heights of between 3,000 and 4,000 feet. Between this range and the Pacific Ocean is a narrow coastal strip.

Deep River Gorges and Broader Valleys

Along parts of the state's borders, the Snake and Columbia rivers have cut deep gashes in the land.

The Pacific side of the Coast Range is drained by several rivers. Among them are (north to south) the Wilson, Umpqua, Coos, Coquille, and Rogue. A splendid coastal highway spans the entire state.

How Climate Varies with Elevation

The arrangement of land explains the varied climate and agricultural resources. Warm, moisture-laden winds blow eastward from the Pacific. As they rise over the Coast Range and the Cascades, they drop much of their moisture. As a result, the rainfall in northwest Oregon ranges from 50 to about 120 inches, and the temperature is fairly even the year around. In the northeast the rainfall is from 10 to 40 inches. The southeast has only about 8 inches annually, and much of the region is desert. Summers are extremely hot and winters extremely cold.

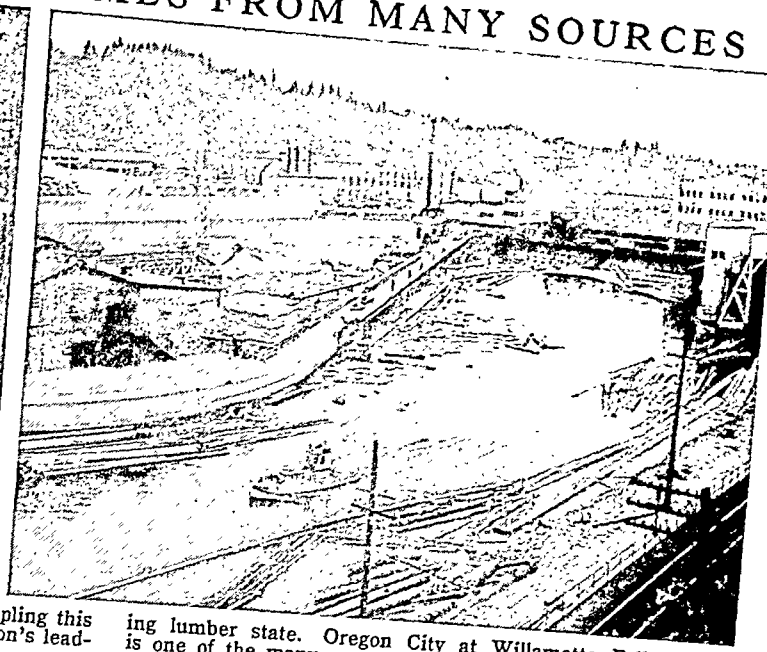
Plant life changes with dramatic suddenness at the Cascades. To the west, trees grow as high as a 12-story building. Where land has been cleared, it supports rich farms. The forests and fertile land extend up to the higher elevations of the Cascade Range.

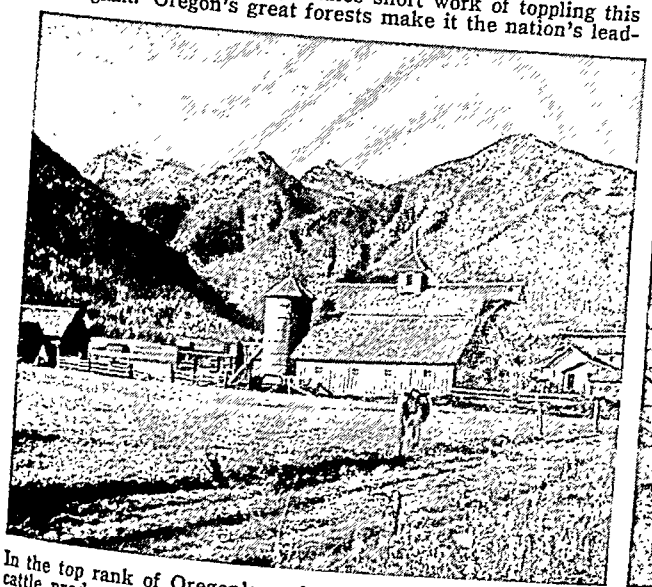
The Willamette Valley between the Coast Range and the Cascades is a trough about 180 miles long and 60 miles wide. It is drained by the Willamette River, which flows northward to join the Columbia. Here live the major portion of the state's people. Portland,

OREGON'S WEALTH COMES FROM MANY SOURCES

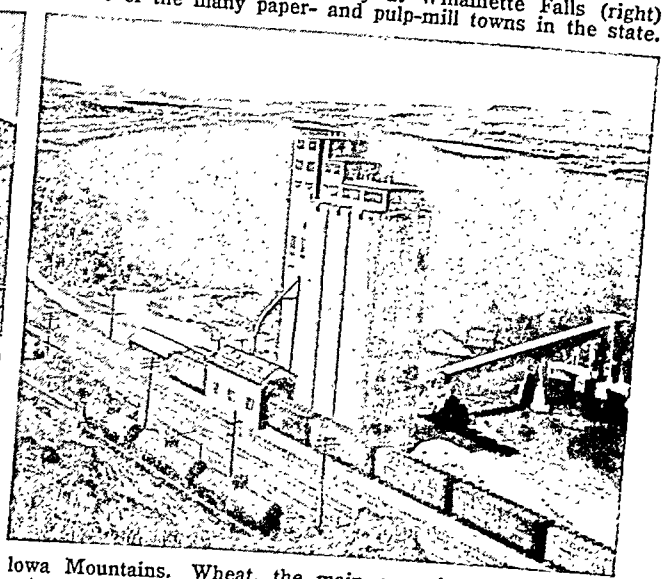


A modern power saw (left) makes short work of toppling this forest giant. Oregon's great forests make it the nation's leading lumber state. Oregon City at Willamette Falls (right) is one of the many paper- and pulp-mill towns in the state.

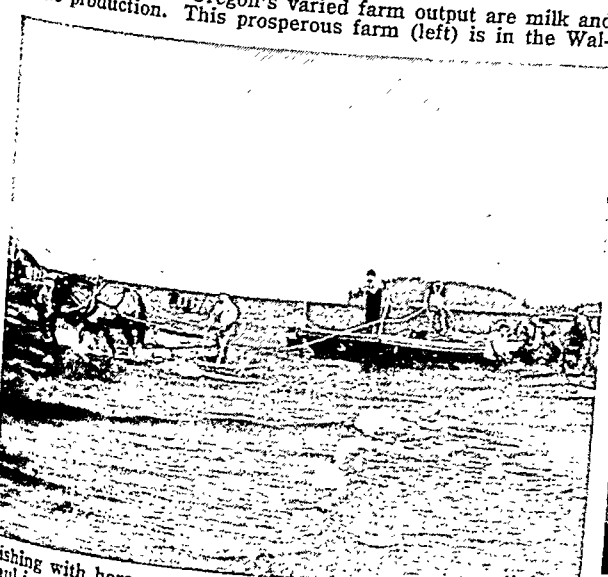




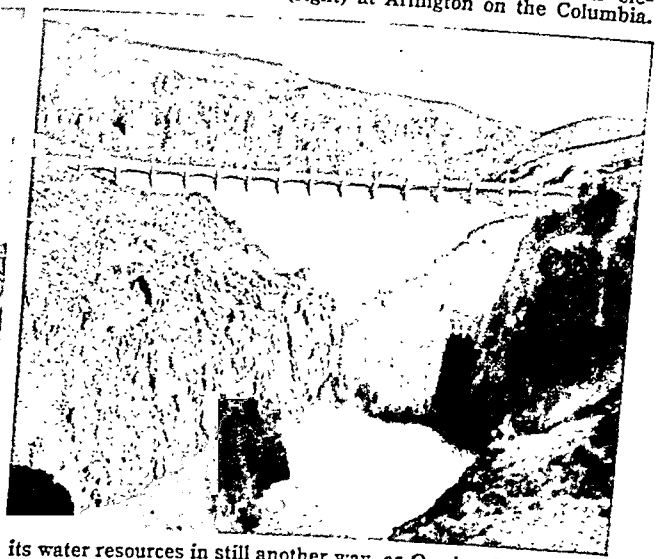
In the top rank of Oregon's varied farm output are milk and cattle production. This prosperous farm (left) is in the Wal-



lowa Mountains. Wheat, the main crop, is stored in elevators such as this one (right) at Arlington on the Columbia.

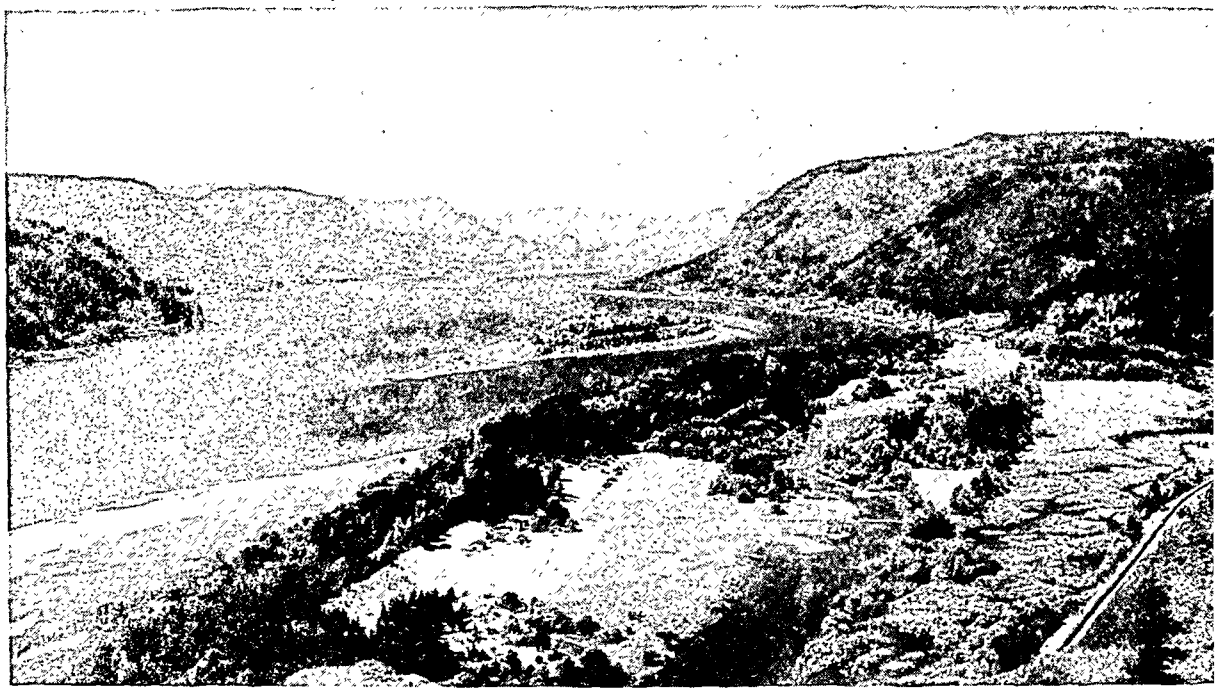


ishing with horses (left) may seem strange, but the animals ul in nets at the mouth of the Columbia River. Oregon uses



its water resources in still another way, as Owyhee Dam (right) indicates. The dam is part of a power and irrigation project.

A SUPERB STRETCH OF THE COLUMBIA RIVER



This majestic panorama of the Columbia River was photographed from Crown Point on the Columbia River Highway in the heart of the Cascade Mountains. Crown Point is on the Oregon side, more than 700 feet above the surface of the river.

Salem, and Eugene, the three largest cities in the state, are in this valley (*see* Portland; Salem). It receives less rain than the seaward slopes of the Coast Range but enough to support a highly diversified agriculture. It is one of the nation's greatest fruit- and berry-growing regions. It is one of the few areas in the country where filberts can be grown, and its orchards of English walnuts are second only to California's. Fiber flax and hops are also important.

When a traveler passes the crest of the Cascades and looks eastward, he sees a land of rolling brush, with trees only along watercourses. Great herds of sheep and cattle roam the plains. In the north are broad fields of wheat, oats, barley, and hay. Throughout the eastern region more than a million acres of land depend upon dams and irrigation for crops.

Products and Industries of Oregon

Oregon's mountains contain a rich supply of timber—Douglas fir, ponderosa pine, hemlock, spruce, and cedar. Oregon is first among all the states in lumbering. More than a thousand busy lumber mills account for more than half the state's manufacturing income. A large related industry is paper and pulp production. The processing of food products is also important. Fruit, vegetable, and fish canneries are found throughout the state. Many flour and grain mills operate along the Columbia. The state's largest manufacturing center is Portland.

Salmon and tuna are the main catch of the valuable Pacific and Columbia River fisheries. Crabs, sharks, flounders, rockfishes, and grayfish are also of value.

Bonneville Dam, on the Columbia River 42 miles upstream from the Willamette's mouth, supplies power for aluminum, chemical, and other industries. Dalles Dam is under construction up the river, and still farther west is McNary Dam. On the North Santiam is Detroit Dam. Owyhee Dam on the Owyhee River is eastern Oregon's greatest irrigation project.

Few Oregon minerals are extensively mined. Stone, sand and gravel, and cement are the most valuable. Gold, silver, quicksilver, copper, carbon dioxide, pumice, and pumicite are also produced. Oregon is one of the few states that mine mercury and chromite.

A New State Old in History

It is believed that the Spaniard Ferrelo was the first white man to gaze on the coast of Oregon (1543). Sir Francis Drake in 1579 sailed his ship, the *Golden Hind,* along the southern coast before turning westward on his famous voyage around the world. A few years later Juan de Fuca claimed to have entered Puget Sound where a strait still bears his name.

Later explorers probed the coast near the Columbia River, at first called the Oregon River. They hoped to find a northwest passage across the continent. A sandbar sealed the mouth of the river, however. In 1778 the British explorer Capt. James Cook missed the entrance to the river. Captain John Meares, daunted by the breakers at the entrance, named the inlet "Deception Bay" and the northern headland "Cape Disappointment," its present name. In 1792, however, Capt. Robert Gray in the *Columbia* (or *Columbia Rediviva*), a trading vessel, crossed the bar and sailed up the river. He renamed it the "Columbia" for his ship. This voyage was the first basis for the United States claim to the Oregon country. Its claim was later strengthened by the explorations of Lewis and Clark in 1805–6, and thereafter by the establishment of fur-trading posts and early settlements.

Continued on page 419

Oregon Fact Summary

OREGON (Ore.): Named for Oregon River; the name first applied to the Columbia. "Oregon" may be from the French, Indian, or Spanish.

Nickname: "Beaver State," from the association of the fur-bearing beavers with the early history of Oregon.

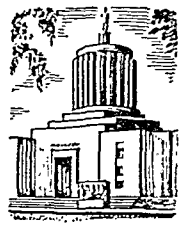
Seal: Star-supported shield showing Pacific Ocean with British ship departing, American steamer arriving; mountains behind, plow in foreground.

Motto: The Union.

Flag: For description and illustration, *see* Flags.

Flower: Oregon grape. **Bird:** Western meadowlark. **Tree:** Douglas fir. **Song:** 'Oregon, My Oregon'—words, J. A. Buchanan; music, Henry B. Murtagh.

THE GOVERNMENT



Capital: Salem (since 1852, when it became territorial capital).

Representation in Congress: Senate, 2; House of Representatives, 4. Electoral votes, 6.

Legislative Assembly: Senators, 30; term, 4 years. Representatives, 60; term, 2 years. Convenes 2d Monday in January in odd-numbered years. There is no limit to the session, but legislators paid for only 50 days.

Constitution: Adopted 1859. Proposed amendment must be (a) passed by majority vote of legislature and (b) ratified by majority voting on amendment at a popular election; also amended by (a) initiative petition signed by 8 per cent of legal voters who cast ballots in last election for a supreme court justice and (b) ratified by majority voting on amendment at a popular election.

Governor: Term, 4 years. Two consecutive terms allowed.

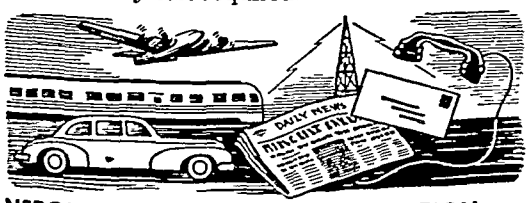
Other Executive Officers: Secretary of state, attorney general, treasurer, all elected; terms, 4 years. Each may succeed himself. Secretary of state and treasurer may hold office for only 8 in any period of 12 years.

Judiciary: Supreme court—7 justices, elected at large; term, 6 years. District courts—8; 11 judges elected; term, 6 years. Circuit courts—17; 36 judges elected; term, 6 years.

County: 35 counties are governed by county courts of 1 judge (term, 6 yrs.) and 2 commissioners (terms, 4 yrs.); Multnomah Co. is governed by 3 commissioners.

Municipal: Mayor-council common; some cities have council-manager; Portland has mayor-commission.

Voting Qualifications: Age, 21; residence in state, 6 months; literacy test required.



TRANSPORTATION AND COMMUNICATION

Transportation: Railroads, 3,200 miles. First railroad, around Cascades of Columbia River (now Union Pacific), 1859. Rural roads, 52,500 miles. Airports, 123.

Communication: Periodicals, 60. Newspapers, 135. First newspaper, *Oregon Spectator*, Oregon City, 1846. Radio stations (AM and FM), 52; first station, KGG, Portland, licensed March 15, 1922. Television stations, 1, KPTV, Portland, began operation Sept. 19, 1952. Telephones, 510,400. Post offices, 591.

THE PEOPLE AND THEIR LAND

Population (1950 census): 1,521,341 (rank among 48 states—32d); urban, 53.9%; rural, 46.1%. Density: 15.8 persons per square mile (rank—38th state).

Extent: Area, 96,981 square miles, including 666 square miles of inland water (9th state in size).

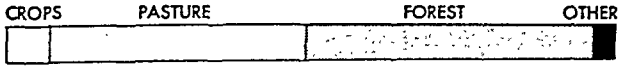
Elevation: highest, Mount Hood, 11,245 feet, near Government Camp; lowest, sea level.

Temperature (°F.): Average—annual, 49°; winter, 34°; spring, 48°; summer, 64°; fall, 50°. Lowest recorded, —54° (Seneca, Feb. 10, 1933, and other locations and dates); highest recorded, 119° (Pendleton, Aug. 10, 1898, and other locations and earlier dates).

Precipitation: Average (inches)—annual, 28; winter, 12; spring, 7; summer, 2; fall, 7. Varies from about 120 in n.w. to about 8 in central and s.e. portions.

Natural Features: Cascade Mts. divide state in two; to the west lie Willamette Valley, Coast Ranges, and the coastal region; to the east, a high plateau covers two thirds of Oregon, broken in the northeast by Blue and Wallowa mountains and dotted with lakes in the south. Chief rivers: Columbia (part of northern boundary), Deschutes, Owyhee, Snake, Willamette.

Land Use: Cropland, 7%; nonforested pasture, 41%; forest, 48%; other (roads, parks, game refuges, wasteland, cities, etc.), 4%.



Natural Resources: *Agricultural*—mild climate; fertile soil and grazing land; water for irrigation. *Industrial*—forests for lumber and paper production; fisheries; farm products for food-processing industries; streams for water power. *Commercial*—shipping on Columbia River and Pacific Ocean; tourist trade.

OCCUPATIONS AND PRODUCTS

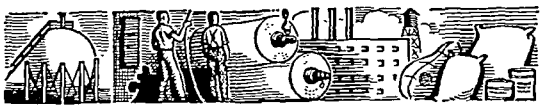
What the People Do to Earn a Living



Major Industries and Occupations, 1950

Fields of Employment	Number Employed	Percentage of Total Employed
Manufacturing	130,609	22.7
Wholesale and retail trade	118,388	20.5
Agriculture, forestry, and fishery	73,205	12.7
Professional services (medical, legal, educational, etc.)	52,546	9.1
Transportation, communication, and other public utilities	49,605	8.6
Construction	42,927	7.4
Personal services (hotel, domestic, laundering, etc.)	32,174	5.6
Government	23,695	4.1
Finance, insurance, and real estate	19,573	3.4
Business and repair services	18,009	3.1
Amusement, recreation, and related services	6,263	1.1
Mining	1,650	0.3
Workers not accounted for	7,866	1.4
Total employed	576,510	100.0

Oregon Fact Summary



What the People Produce

A. Manufactured Goods (Rank among states—25th)
Value added by manufacture* (1952), $1,049,151,000

Leading Industries in 1947 (with Principal Products)	Value Added by Manufacture	Rank among States
LUMBER AND PRODUCTS..... Sawmills and planing mills; plywood plants	$363,561,000	1
FOOD AND KINDRED PRODUCTS..... Canning, preserving, and freezing; bakery products; flour and meal; meat products; dairy products	107,767,000	23
PAPER AND ALLIED PRODUCTS.....	34,653,000	25
PRINTING AND PUBLISHING.....	24,311,000	26
FABRICATED METAL PRODUCTS..... Boiler shop products; structural and ornamental products	20,685,000	25
MACHINERY (EXCEPT ELECTRICAL). Industrial trucks and tractors	19,463,000	29

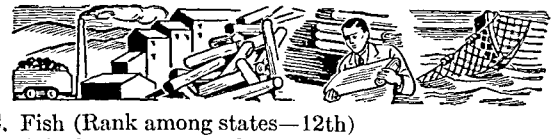
*For explanation of value added by manufacture, *see* Census.



B. Farm Products (Rank among states—30th)
Total cash income (1952), $411,087,000

Products	Amount Produced (10-Year-Average)	Rank within State*	Rank among States†
Milk.....	647,000,000 qts.	1	24
Cattle.....	270,549,000 lbs.	2	23
Wheat.....	22,666,000 bu.	3	15
Hay.....	1,927,000 tons	4	21
Eggs.....	39,000,000 doz.	5	31
Potatoes.....	10,736,000 bu.	6	12
Truck crops....	255,000 tons	7	17
Hogs.....	79,569,000 lbs.	8	32
Pears.....	4,789,000 bu.	9	3
Turkeys.....	37,017,000 lbs.	10	4

*Rank in dollar value †Rank in units produced



C. Fish (Rank among states—12th)
(Marine waters and coastal rivers, 1950), catch, 58,256,000 lbs.; value, $7,151,000

D. Minerals (Fuels, Metals, and Stone)
Annual value (1951), $28,401,000
Rank among states—37th

Minerals (1951)	Amount Produced	Value
Stone.....	8,722,000 tons	$10,831,000
Sand and gravel..	10,504,000 tons	9,117,000
Cement*.....	.....	.....

*Cement ranks 3d in value; exact figures not available.

E. Lumber (Rank among states—1st)
6,231,000,000 board feet (5-year average)

F. Trade

Trade (1948)	Sales	Rank among States
Wholesale.....	$1,908,141,000	25
Retail.....	1,597,300,000	28
Service.....	145,677,000	24

EDUCATION



Public Schools: Elementary, 1,065; secondary, 224. Compulsory school age, 7 through 18 or graduation from high school. State Board of Education composed of 7 members appointed by governor with approval of Senate for 7-year terms, 1 to expire each year. State supt. of public instruction elected for 4-year term. County supts. elected in 23 counties for 4-year terms; appointed in 13 counties by county board for 1- to 5-year terms. City boards elected for 5-year terms, appoint supts. for 1 to 5 years.

Private and Parochial Schools: 133.

Colleges and Universities (accredited): Colleges, 15; junior colleges, 1. State-supported colleges and universities are directed by the State Board of Higher Education consisting of 9 members appointed by the governor. Colleges include the University of Oregon, Eugene; Oregon State College, Corvallis; and three teachers colleges: Oregon College of Education, Monmouth; Southern Oregon College of Education, Ashland; and Eastern Oregon College of Education, La Grande.

Special State Schools: Oregon Service Center for the Blind, Portland; Oregon Fairview Home (for feebleminded), State School for Deaf, State School for Blind, all in Salem; Oregon Technical Institute, Oretech.

Libraries: City and town public libraries, 84; independent county library systems, 3; 16 counties contract for service with city libraries. State library aids in developing libraries through state librarian and school library specialist. Noted special libraries: Ore. Historical Society Lib., Portland; Supreme Court Lib., Salem.

Outstanding Museums: Museum of Art and State Museum of Anthropology, both at University of Oregon, Eugene; Oregon Museum of Science and Industry and Portland Art Museum, both at Portland.

CORRECTIONAL AND PENAL INSTITUTIONS

Hillcrest School of Oregon (Girls), Salem; MacLaren School for Boys, Woodburn; Oregon State Penitentiary, Salem.

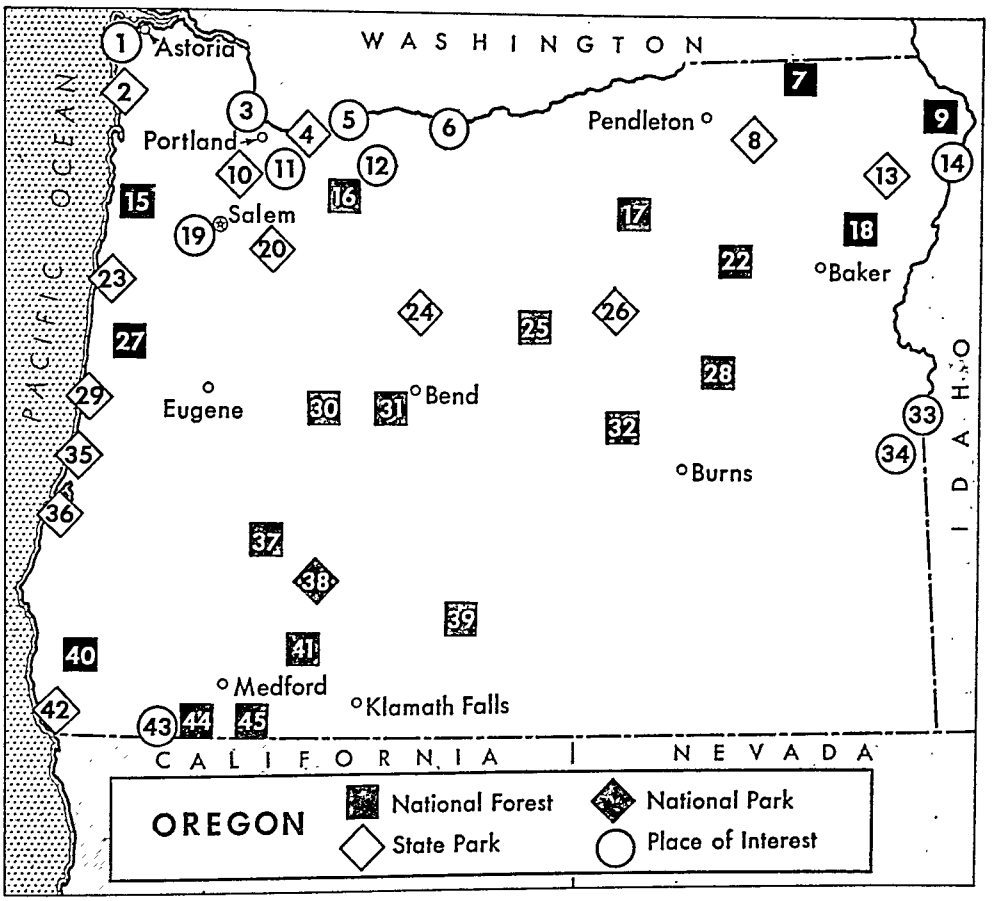
STATE PARKS*†

Armitage—on McKenzie R. near Eugene; s.w. of (20).
Azalea—five varieties of wild azaleas; picnicking (42)
Battle Mountain—near Ukiah; woodland; s.w. of (8)
Battle Rock—settlers fought Indians, 1851; s. of (36)
Boiler Bay—scenic view of bay; fishing (23).
Bradley—scenic Clatsop Crest; near Astoria; n.e. of (2).
Cape Lookout—Sitka spruce; sea-bird rookery; s. of (2).
Cascadia—on S. Santiam R.; near Lebanon; w. of (24).
Casey—on Rogue R. near Medford; west of symbol (41).
Champoeg—government for first American commonwealth on Pacific coast begun here, 1843; museum (10).
Collier Memorial—fishing; west of symbol (39).
Cove Palisades—great canyon; three rivers; fishing (24).
Crown Point—Columbia R. Gorge; Vista House (4).
Devil's Elbow—sandy ocean beach; marine views (29).
Devil's Punch Bowl—bowl-shaped rock formation (23).
Ecola—ocean beach; sea lions, birds, elk; trails (2).
Emigrant Springs—resting place on Oregon Trail (8)
Harris Beach—rocky cliffs; ocean beaches; trails (42)
Hendricks Bridge—on McKenzie R.; near symbol (30).
Honeyman Memorial—forest on two lakes (29).
Humbug Mountain—1,750-ft. mountain; trail; s. of (36).

*Numbers in parentheses are keyed to map.
†There are 180 state parks and wayside areas; 37 are listed here.

Oregon Fact Summary

Lava River Caves — formed by lava flow; south of symbol (31).
Maud Williamson — forested picnic area (10).
Neptune—Cook's Chasm; north of (29).
Painted Hills—colored ridges; n.w. of (26).
Patterson Memorial—on seashore; s. of (23).
Ponsler Memorial—ocean wayside (29).
Rocky Creek—surf fishing; rugged coast (23).
Saddle Mt.—mountain; deer, elk; n.e. of (2).
Short Sand Beach — Neahkahnie Mt. (2).
Silver Falls—10 falls; highest, 179 ft. (20).
Sunset Bay—rocky coast; beach (36).
Talbot—250-ft. Latourell Falls (4).
Tou Velle—on Rogue R.; west of symbol (41).
Viento — picnicking; e. of symbol (5).
Wallowa Lake—picnicking (13).
Yaquina Bay—beach; lighthouse (23).



STATE FORESTS

State forest land of 710,027 acres is scattered in 16 counties: Tillamook, 300,000 acres; Clatsop, 139,500 acres; Coos, 48,000 acres; Washington, 49,192 acres; Douglas, 38,413 acres; balance in Benton, Clackamas, Columbia, Josephine, Klamath, Linn, Lincoln, Lane, Marion, Polk, Curry.

NATIONAL FORESTS*

Deschutes—1,927,401 acres; hdqrs., Bend (31).
Fremont—1,772,637 acres; hdqrs., Lakeview (39).
Klamath—24,452 acres in state; total, 1,497,257 acres in Calif. and Ore.; hdqrs., Yreka, Calif. (45).
Malheur—1,275,910 acres; hdqrs., John Day (28).
Mount Hood—1,183,896 acres; hdqrs., Portland (16).
Ochoco—980,887 acres; hdqrs., Prineville (25, 32).
Rogue River—1,147,424 acres in state; total 1,203,630 acres in Calif. and Ore.; hdqrs., Medford (41, 44).
Siskiyou—1,350,440 acres in state; total 1,389,169 acres in Calif. and Ore.; hdqrs., Grants Pass (40).
Siuslaw—878,665 acres; hdqrs., Corvallis (15, 27).
Umatilla—1,192,178 acres in state; total 1,514,011 acres in Wash. and Ore.; hdqrs., Pendleton (7, 17).
Umpqua—1,180,907 acres; hdqrs., Roseburg (37).
Wallowa—1,073,974 acres; hdqrs., Enterprise (9).
Whitman—1,568,431 acres; hdqrs., Baker (18, 22).
Willamette—1,819,966 acres; hdqrs., Eugene (30).

NATIONAL PARK*

Crater Lake—160,290 acres in southwestern Oregon; includes brilliant blue lake in crater of extinct volcano, surrounded by 500–2,000 foot walls which are multicolored; roadway around rim of crater (38).

*Numbers in parentheses are keyed to map.

PLACES OF INTEREST*

Astoria—first permanent settlement in Oregon country, 1811; named for John Jacob Astor; pictorial frieze of early history on Astor Column (1).
Bonneville Dam—on Columbia River; salmon pass over dam in mile-long fish ladder and fish lock (5).
Celilo Falls—Indian salmon-fishing places guaranteed exclusively to them by treaty; east of The Dalles (6).
Dalles, The—Lewis and Clark's Rock Fort overlooks the Columbia River; Old Fort Dalles Museum (6).
Detroit Dam—on North Santiam River; east of (20).
Grand Canyon of the Snake River—deepest gash in North America; deepest part, Hell's Canyon (14).
McLoughlin House Natl. Historic Site—Oregon City; home of "father of Oregon," John McLoughlin, 1846–57 (11).
McNary Dam—on Columbia River; northwest of (8).
Mount Hood—perpetually snow-capped peak, 11,245 feet high; skiway; 3-mile aerial tramway (12).
Multnomah Falls—spectacular falls (total drop 850 feet) beside Columbia River Highway (5).
Oregon Caves National Monument—series of limestone and marble caverns in Siskiyou Range (43).
Oregon Trail—pioneers' route from Mississippi Valley during 1800's; crossed Snake River into Oregon at Weiser, Idaho (33), then northwest to Columbia River and westward to Willamette Valley at Portland (3) and to Astoria (1) (*see* Oregon Trail).
Owyhee Dam—417-ft. structure across the narrow gorge of Owyhee River; forms irrigation reservoir (34).
Portland—"city of roses" (*see* Portland) (3).
Salem—State Capitol; Willamette Univ. (*see* Salem) (19).
Seaside—ocean resort; relic of Lewis and Clark Expedition, and monument; Tillamook Lighthouse (1).

Oregon Fact Summary

LARGEST CITIES (1950 census)

Portland (373,628): ocean port through Columbia, Willamette rivers; shipbuilding; textiles; wood products.
Salem (43,140): state capital; center of flax and fruit-growing area; paper milling; canning; linen textiles.
Eugene (35,879): agricultural and lumbering center; lumber and timber products; University of Oregon.
Medford (17,305): fruit growing and packing; lumbering.
Corvallis (16,207): farm, lumber, educational center.
Klamath Falls (15,875): sawmills; farm machinery.
Astoria (12,331): on Columbia River; fish packing.

THE PEOPLE BUILD THEIR STATE



1543—Juan Rodríguez Cabrillo and Bartolomé Ferrelo, Spanish navigators, may have been first white men to sight Oregon coast.
1579—Sir Francis Drake, English commander, reaches Oregon coast at about 44th parallel in ship *Golden Hind;* names area New Albion as basis for English claim to region.
1602—Sebastian Viscaino probably sights Cape Blanco.
1741—Vitus Bering, commissioned by Peter the Great, reaches Alaska, opening way for Russian settlement of Alaska and claim to Oregon region.
1778—First Americans visit Oregon coast in expedition led by British captain, James Cook, in search of Northwest Passage; they reach Vancouver Island and anchor in bay named Nootka Sound by Cook.
1788—Capt. John Meares sights mouth of Columbia; reports it is only a bay. Capt. Robert Gray and Capt. John Kendrick command first American ships to sail along Oregon coast.
1789—Estevan José Martinez takes possession of Vancouver I. for Spain, driving out British traders.
1792—Capt. Robert Gray discovers and names Columbia River. Lieut. William Broughton of British navy, later in year, sails up river to Cascades; discovers and names Mt. Hood; claims area for Britain.
1793—Sir Alexander Mackenzie makes overland trip from Canada to Pacific; opens area for trappers.
1800—Americans gain monopoly of Oregon fur trade.
1803—Louisiana Purchase brings U. S. borders to the Northwest; draws attention to Oregon country.
1805—Meriwether Lewis and William Clark reach headwaters of Columbia River and Cape Disappointment; return to St. Louis, 1806.
1811—John Jacob Astor's Pacific Fur Company builds Astoria trading post near mouth of Columbia R.
1813—British fur-trading North West Company takes over Astoria and renames it Fort George.
1818—U. S. and Britain agree to occupy Oregon country jointly for 10 years; extend agreement indefinitely, 1827. Fort George restored to U. S.
1819—Spain renounces claims north of 42° N.
1821—North West and Hudson's Bay companies merge.
1824—Russia gives up claims south of 54° 40′. Canadian trader John McLoughlin comes to Fort George; builds Fort Vancouver on Columbia River, 1825.
1832—First school in region opens at Fort Vancouver.
1834—Nathaniel Wyeth builds Fort William on Sauvie I.; Jason Lee leads first missionaries in region.
1835—Jason and Daniel Lee establish mission school in Willamette Valley; Oregon Institute (now Willamette University) takes over school, 1844.
1836—Marcus Whitman and Henry Spaulding, missionaries, arrive in region.
1839—"Peoria party," group of early settlers, arrive in Willamette Valley from Illinois.
1843—"Great migration" of about 900 persons arrives over Oregon Trail; first U. S. government west of Rockies organized at Champoeg (Marion Co.).
1844—Agitation for U. S. control of Oregon country makes "54-40 or Fight" a presidential campaign slogan. William Overton and Amos L. Lovejoy establish settlement, which is named Portland, 1845.
1845—First free public schools in area established.
1846—Treaty with Britain gives U. S. title to the Oregon country; sets northern boundary at 49th parallel. *Oregon Spectator,* published at Oregon City, is first newspaper west of Rocky Mts.
1847—Regular mail service starts; Indians begin series of wars which last until 1880; first extensive fruit orchards in Oregon set out near Milwaukie.
1848—Oregon Territory created; extends from 42d to 49th parallel and from Continental Divide to Pacific; capital, Oregon City; first governor, Gen. Joseph Lane. First Chinese enter territory. Discovery of gold in California draws many settlers.
1850—Donation Land Act provides free land for settlers; steamboat *Columbia* opens service, Oregon City to Astoria; first steam sawmill built at Portland.
1852—Gold discovered on Jackson Creek; capital moved from Oregon City to Salem.
1853—Washington Territory created out of Oregon.
1855—Territorial Capitol burns; capital moved temporarily to Corvallis, but returned to Salem, 1856.
1857—State constitution drafted; prohibits slavery.
1859—Oregon becomes 33d state, February 14, capital, Salem; first governor, John Whiteaker.
1861—Gold discovered in eastern Oregon; gold seekers stay to settle and farm region.
1865—First national bank west of Rocky Mountains organized in Portland.
1866—First fish cannery established on Columbia River.
1868—Work begins on railway to California. State Agricultural College founded at Corvallis. The *Sally Brown* sails from Portland to Liverpool with first full cargo of Oregon wheat to be exported.
1872—Modoc War begins; ends next year. University of Oregon chartered; opens at Eugene, Oct. 18, 1876.
1878—Paiute and Bannock Indians terrorize settlers in eastern and central Oregon; trouble ends, 1880.
1883—Northern Pacific Railroad links Portland and East by way of Seattle. First direct railway between Oregon and East completed (Union Pacific), 1884.
1890—Great expansion of lumber industry begins.
1902—Crater Lake National Park created. First of Oregon System governmental reforms enacted; include initiative and referendum; primary adopted, 1904; recall adopted, 1908.
1905—Lewis and Clark Centennial held at Portland.
1913—Legislature enacts Workmen's Compensation Law.
1932—Owyhee Dam on Owyhee River completed.
1937—Bonneville Dam on Columbia R. completed.
1948—Flood destroys town of Vanport, near Portland.
1949—Oregon adopts Fair Employment Practices Law. Record earthquake shakes Oregon coastal region.
1950—U. S. Court of Appeals awards Siletz Reservation Indians 16½ million dollars for 1855 land claim.
1952—Oregon governor, Douglas McKay, appointed United States secretary of the interior.
1953—McNary Dam on the Columbia River and Detroit Dam on the North Santiam completed. Dalles Dam on the Columbia under construction.

OREGON

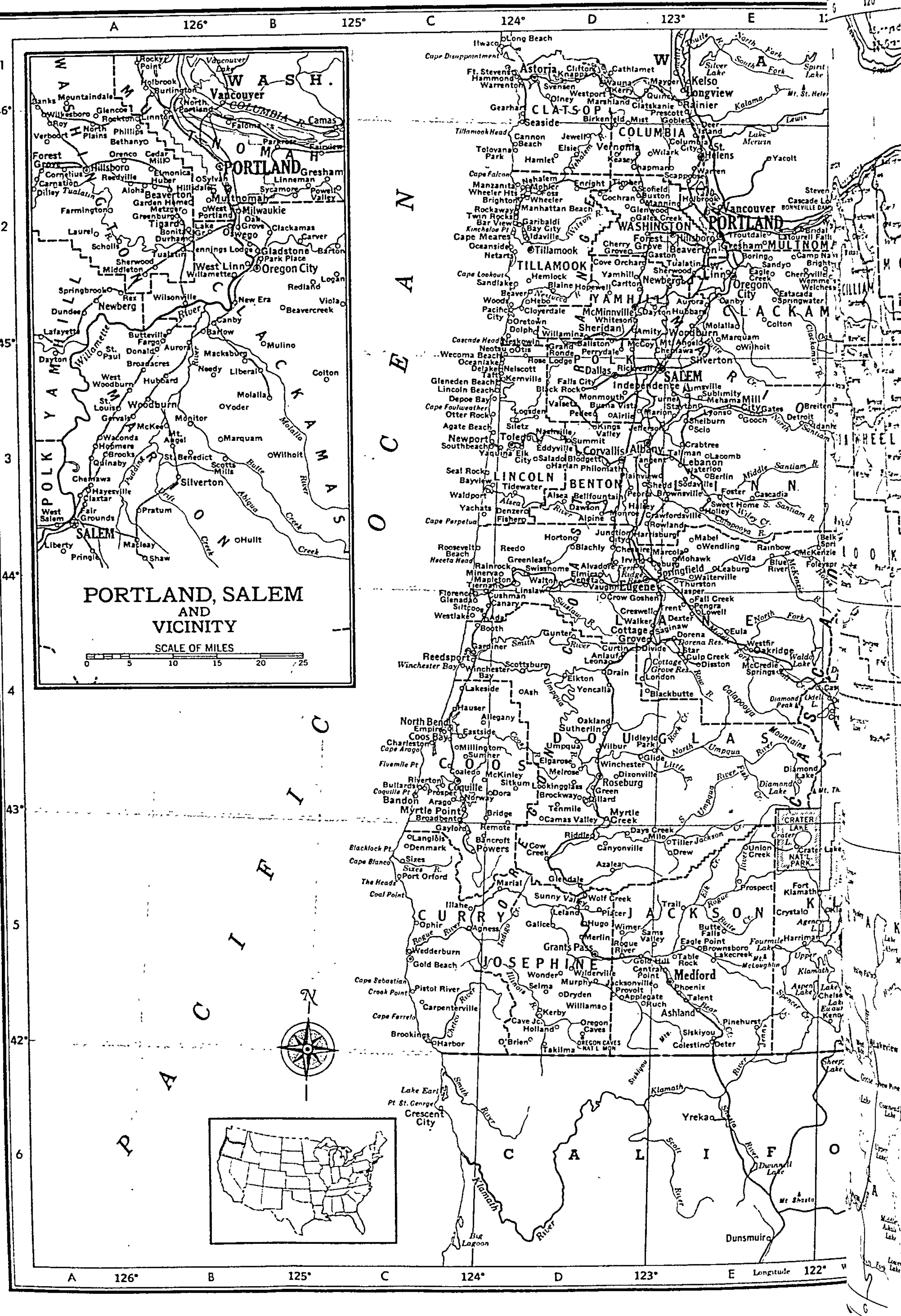
COUNTIES

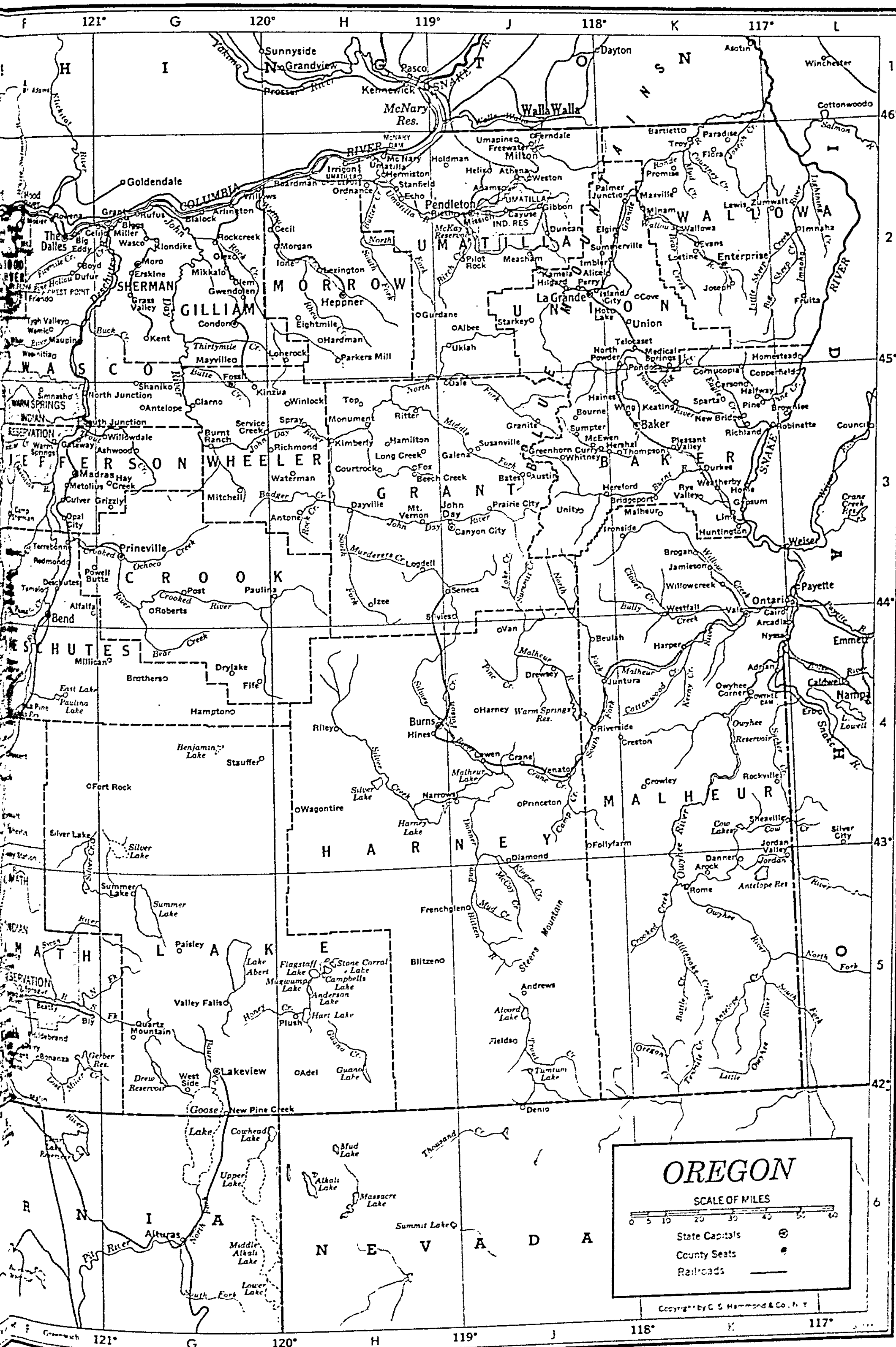
Baker	16,175	K 3
Benton	31,570	D 3
Clackamas	86,716	E 2
Clatsop	30,776	D 1
Columbia	22,967	D 2
Coos	42,265	C 4
Crook	8,991	G 3
Curry	6,048	C 5
Deschutes	21,812	F 4
Douglas	54,549	E 4
Gilliam	2,817	G 2
Grant	8,329	J 3
Harney	6,113	H 4
Hood River	12,740	F 2
Jackson	58,510	E 5
Jefferson	5,536	F 3
Josephine	26,542	D 5
Klamath	42,150	F 5
Lake	6,649	G 5
Lane	125,776	E 4
Lincoln	21,308	D 3
Linn	54,317	E 3
Malheur	23,223	K 4
Marion	101,401	E 3
Morrow	4,783	H 2
Multnomah	471,537	E 2
Polk	26,317	D 3
Sherman	2,271	G 2
Tillamook	18,606	D 2
Umatilla	41,703	J 2
Union	17,962	J 2
Wallowa	7,264	K 2
Wasco	15,552	F 2
Washington	61,269	D 2
Wheeler	3,313	G 3
Yamhill	33,484	D 2

CITIES AND TOWNS

Ada	100	D 4
Adams	154	J 2
Adel	83	H 5
Adrian	170	K 4
Agate Beach	379	C 3
Agness	48	D 5
Airlie	30	D 3
Albany	10,115	D 3
Albee	7	J 2
Alfalfa	25	F 3
Algoma	50	F 5
Alicel	30	J 2
Allegany	220	D 4
Aloha	50	A 2
Alpine	325	D 3
Alsea	130	D 3
Altamont	9,419	F 5
Alvadore	130	D 3
Amity	672	D 2
Andrews	8	J 5
Anlauf	50	D 4
Antelope	60	G 3
Antone		H 3
Applegate	75	D 5
Arago	117	C 4
Arcadia		K 4
Arlington	686	G 2
Arock	100	K 5
Ash	120	D 4
Ashland	7,739	E 5
Ashwood	19	G 3
Astoria	12,331	D 1
Athena	750	J 2
Aumsville	281	E 3
Aurora	242	A 2
Austin	39	J 3
Azalea	50	D 5
Baker	9,471	K 3
Ballston	100	D 2
Bancroft	75	D 5
Bandon	1,251	C 4
Banks	376	A 1
Bar View	200	C 2
Barlow	75	B 2
Bartlett		K 2
Barton		B 2
Bates	500	J 3
Bay City	761	D 2
Bayview	15	C 3
Beatty	50	F 5
Beaver	567	D 2
Beavercreek	60	B 2
Beaverton	2,512	A 2
Beech Creek	2	H 3
Belknap Springs	12	F 3
Bellfountain	50	D 3
Bend	11,409	F 3
Berlin		E 3
Bethany	20	A 2
Beulah	10	J 4
Big Eddy	36	F 2
Biggs	15	G 2
Birkenfeld	100	D 1
Blachly	24	D 3
Black Rock	17	D 3
Blackbutte	50	E 4
Blaine	75	D 2
Blalock	21	G 2
Blitzen	7	H 5
Blodgett	200	D 3
Blue River	200	E 3
Bly	800	F 5
Boardman	120	H 2
Bonanza	259	F 5
Bonita	50	A 2
Bonneville	250	F 2
Booth		C 4
Boring	675	E 2
Bourne		J 3
Boyd	38	F 2
Breitenbush	6	F 3
Bridal Veil	120	E 2
Bridge	200	D 4
Bridgeport	63	K 3
Brighton	107	C 2
Brightwood	150	E 2
Broadacres	30	A 3
Broadbent	50	C 4
Brockway	61	D 4
Brogan	75	K 3
Brookings	1,000	C 5
Brooks	350	A 3
Brothers	15	G 4
Brownlee		L 3
Brownsboro	100	E 5
Brownsville	1,175	E 3
Buena Vista	160	D 3
Bullards	25	C 4
Burlington	200	A 1
Burns	3,093	H 4
Burnt Ranch		G 3
Butte Falls	372	E 5
Butteville	50	A 2
Buxton	150	D 2
Cairo	50	K 4
Camas Valley	60	D 4
Camp Namanu	2	E 2
Camp Sherman	50	F 3
Canary	50	D 4
Canby	1,671	B 2
Canemah		B 2
Cannon Beach		D 2
Canyon City	508	J 3
Canyonville	861	D 5
Cape Meares	70	C 2
Carlton	1,081	D 2
Carnation	100	A 2
Carpenterville	30	C 5
Carson	100	K 3
Carver	200	B 2
Cascade Locks	733	F 2
Cascade Summit	50	F 4
Cascadia	200	E 3
Cave Junction	283	D 5
Cayuse	48	J 2
Cecil	20	H 2
Cedar Mill	300	A 2
Celilo	300	G 2
Central Point	1,667	D 5
Chapman	100	D 2
Charleston	576	C 4
Chelsea	300	F 5
Chemawa	850	A 3
Chemult	115	F 4
Cherry Grove	375	D 2
Cherryville	160	E 2
Cheshire	73	D 3
Chiloquin	668	F 5
Clackamas	550	B 2
Clarno		G 3
Clatskanie	901	D 1
Claxtar	100	A 3
Clem	12	G 2
Clifton	68	D 1
Cloverdale	280	D 2
Coaledo	125	C 4
Coburg	693	D 3
Cochran	50	D 2
Colestin	7	E 5
Colton	167	B 3
Columbia City	405	E 2
Condon	968	G 2
Coos Bay	6,223	C 4
Copperfield	13	K 3
Coquille	3,523	C 4
Cornelius	998	A 2
Cornucopia		K 3
Corvallis	16,207	D 3
Cottage Grove	3,536	D 4
Courtrock	60	H 3
Cove	282	K 2
Cove Orchard	140	D 2
Cow Creek		D 5
Crabtree	350	E 3
Crane	99	J 4
Crater Lake	47	E 5
Crawfordsville	250	E 3
Crescent	300	F 4
Crescent Lake	50	F 4
Creston	4	K 4
Creswell	662	D 4
Crow	100	D 4
Crowley	5	K 4
Crystal	15	E 5
Culp Creek	260	E 4
Culver	301	F 3
Curry	4	J 3
Curtin	70	D 4
Cushman	150	D 4
Dairy	50	F 5
Dale	10	J 3
Dallas	4,793	D 3
Danner	20	K 5
Dawson	40	D 3
Days Creek	40	D 5
Dayton	719	A 3
Dayville	286	H 3
Dee	250	F 2
Deer Island	79	E 2
Delake	644	C 3
Denmark	13	C 5
Denzer		D 3
Depoe Bay	750	C 3
Deschutes	20	F 3
Deter	15	E 5
Detroit		E 3
Dexter	400	E 4
Diamond	8	J 4
Diamond Lake		E 4
Dillard	300	D 4
Dilley	200	A 2
Disston	300	E 4
Divide		D 4
Dixonville	30	D 4
Dolph	50	D 2
Donald	187	A 3
Dora	80	D 4
Dorena	300	E 4
Drain	1,150	D 4
Draperville	201	*D 3
Drew	265	E 5
Drewsey	64	J 4
Dryden	25	D 5
Drylake	18	G 4
Dufur	422	F 2
Duncan	18	J 2
Dundee	308	A 2
Durham	250	A 2
Durkee	50	K 3
Eagle Creek	75	E 2
Eagle Point	607	E 5
Eastside	890	C 4
Echo	457	H 2
Eddyville		D 3
Eightmile		H 2
Elgarose	12	D 4
Elgin	1,223	K 2
Elk City	50	D 3
Elk Lake		F 4
Elkton	201	D 4
Elmira	500	D 3
Elmonica	50	A 2
Elsie		D 2
Empire	2,261	C 4
Enright	5	D 2
Enterprise	1,718	K 2
Erskine	7	G 2
Estacada	950	E 2
Eugene	35,879	D 3
Eula	20	E 4
Evans	47	K 2
Fair Grounds		A 3
Fairview	438	B 2
Fall Creek	144	E 4
Falls City	853	D 3
Faloma	600	B 2
Fargo	18	A 3
Farmington	20	A 2
Faubion	30	F 2
Ferndale	225	J 2
Fields	12	J 5
Fife		G 4
Fisher		D 3
Flora	190	K 2
Florence	1,026	C 4
Foleysprings	4	E 3
Follyfarm	5	J 4
Forest Grove	4,343	A 2
Fort Klamath	350	E 5
Fort Rock	18	G 4
Fort Stevens	60	C 1
Foss	50	D 2
Fossil	645	G 2
Foster	350	E 3
Fox	65	H 3
Freewater	1,489	J 2
Frenchglen	46	H 5
Friend	15	F 2
Fruita		L 2
Galena	1	J 3
Gales Creek	200	D 2
Galice	40	D 5
Garden Home	750	A 2
Gardiner	600	C 4
Garibaldi	1,249	D 2
Gaston	368	D 2
Gates	445	E 3
Gateway	75	F 3
Gaylord	135	C 5
Gearhart	568	C 1
Gervais	457	A 3
Gibbon	52	J 2
Gladstone	2,434	B 2
Glenada	110	C 4
Glencoe	10	A 1
Glendale	871	D 5
Gleneden Beach		
	185	C 3
Glenwood	20	D 2
Glide	100	D 4
Goble	73	E 1
Gold Beach	677	C 5
Gold Hill	619	D 5
Gooch	25	E 3
Goshen	250	D 4
Government Camp	100	F 2
Grand Ronde	800	D 2
Granite	40	J 3
Grant	25	G 2
Grants Pass	8,116	D 5
Grass Valley	195	G 2
Green	60	D 4
Greenburg	20	A 2
Greenhorn		J 3
Greenleaf	111	D 3
Gresham	3,049	B 2
Grizzly	25	G 3
Gunter	25	D 4
Gurdane	18	J 2
Gwendolen	6	G 2
Gypsum		K 3
Haines	321	J 3
Halfway	312	K 3
Halsey	388	D 3
Hamilton	58	H 3
Hamlet	20	D 2
Hammond	522	C 1
Hampton	22	G 4
Harbor	600	C 5
Hardman	58	H 2
Harlan	240	D 3
Harney	6	J 4
Harper	200	K 4
Harriman	42	E 5
Harrisburg	862	D 3
Hauser	158	C 4
Hay Creek	15	G 3
Hayesville	2,697	A 3
Hebo	250	D 2
Helix	182	J 2
Hemlock	20	D 2
Heppner	1,648	H 2
Hereford	66	K 3
Hermiston	3,804	H 2
Hershal	4	K 3
Hildebrand		F 5
Hilgard	40	J 2
Hillsboro	5,142	A 2
Hillsdale	1,200	B 2
Hines	918	H 4
Holbrook	100	A 1
Holdman	30	J 2
Holland	100	D 5
Holley	225	E 3
Home	10	K 3
Homestead	25	L 2
Hood River	3,701	F 2
Hopewell	125	D 2
Hopmere	75	A 3
Horton	168	D 3
Hot Lake	25	K 2
Hubbard	493	A 3
Huber	250	A 2
Hugo	100	D 5
Hullt		B 3
Huntington	733	K 3
Idanha	442	E 3
Idaville	150	D 2
Idleyld Park	100	D 4
Illahe		C 5
Imbler	149	J 2
Imnaha	30	L 2
Independence	1,987	D 3
Ione	262	H 2
Ironside	150	K 3
Irrigon	75	H 2
Irving	300	D 3
Island City	138	K 2
Izee	4	H 3
Jacksonville	1,193	D 5
Jamieson	300	K 3
Jasper	200	E 3
Jefferson	636	D 3
Jennings Lodge	3,500	B 2
Jewell		D 2
John Day	1,597	J 3
Jordan Valley	236	K 5
Joseph	666	K 2
Junction City	1,475	D 3
Juntura	107	K 4
Kamela	25	J 2
Keasey	8	D 2
Keating	10	K 3
Keno	300	F 5
Kent	60	G 2
Kerby	150	D 5
Kernville	105	D 3
Kerry	30	D 1
Kimberly	60	H 3

*No room on map for name.


PORTLAND, SALEM
AND
VICINITY
SCALE OF MILES
0 5 10 15 20 25
WASH.
MULTNOMAH
CLACKAMAS
WASHINGTON
YAMHILL
MARION
POLK
PORTLAND
Vancouver
Gresham
Hillsboro
Beaverton
Milwaukie
Oregon City
Newberg
Woodburn
Silverton
SALEM
PACIFIC OCEAN
CLATSOP
COLUMBIA
TILLAMOOK
LINCOLN
BENTON
LANE
DOUGLAS
COOS
CURRY
JOSEPHINE
JACKSON
CALIFORNIA
Astoria
Longview
Kelso
Seaside
Tillamook
McMinnville
Dallas
Newport
Corvallis
Albany
Lebanon
Eugene
Springfield
Reedsport
North Bend
Coos Bay
Coquille
Bandon
Roseburg
Grants Pass
Medford
Ashland
Gold Beach
Brookings
Crescent City
Yreka
Dunsmuir
CRATER LAKE NAT'L PARK
A 126° B 125° C 124° D 123° E
A 126° B 125° C 124° D 123° E Longitude 122°



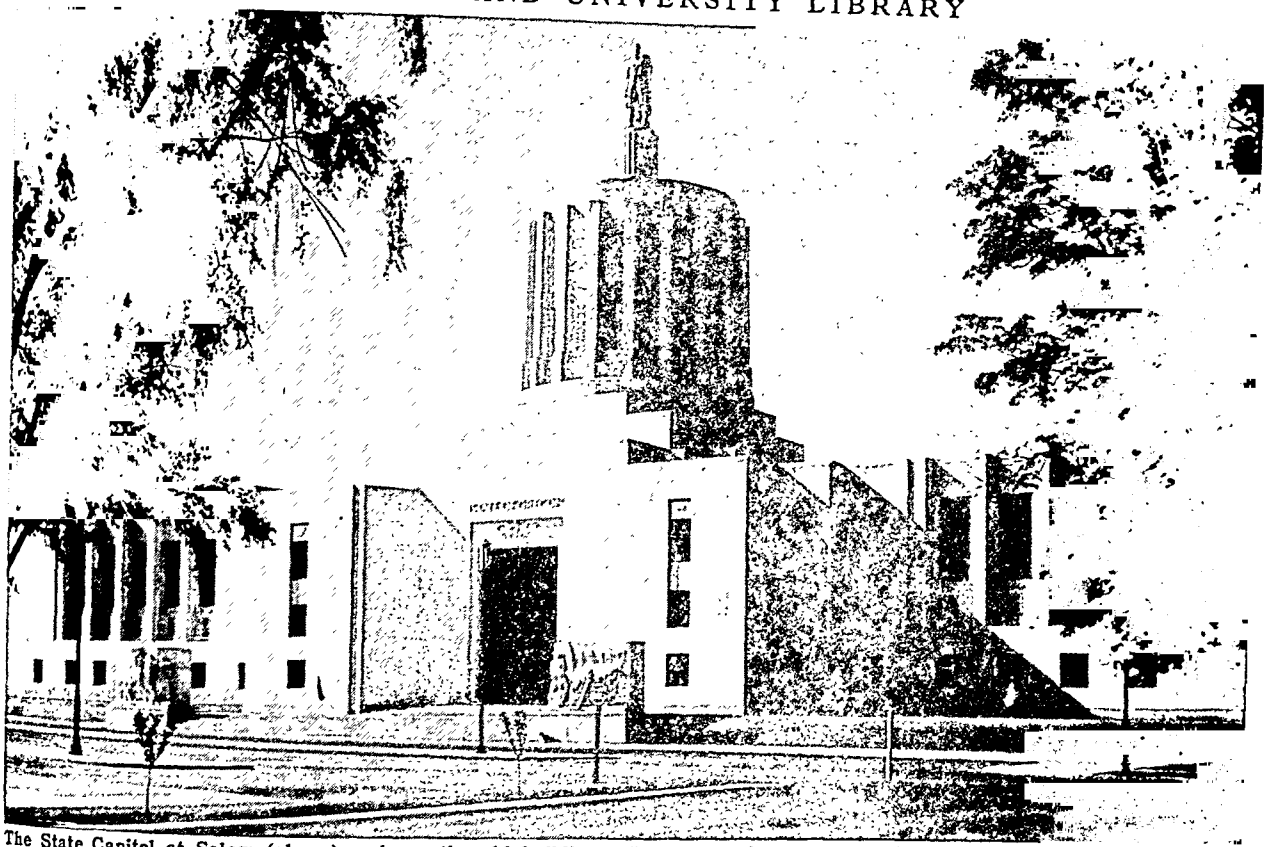
OREGON
SCALE OF MILES
0 5 10 20 30 40 50
State Capitals
County Seats
Railroads
Copyright by C. S. Hammond & Co., N. Y.
121° 120° 119° 118° 117°
46° 45° 44° 43° 42°
F G H J K L
1 2 3 4 5 6
UMATILLA
MORROW
GILLIAM
SHERMAN
WASCO
JEFFERSON
WHEELER
GRANT
UNION
WALLOWA
BAKER
CROOK
DESCHUTES
HARNEY
MALHEUR
LAKE
KLAMATH
BLUE MOUNTAINS
COLUMBIA RIVER
SNAKE R.
NEVADA
CALIFORNIA
IDAHO
WASHINGTON
Sunnyside
Grandview
Prosser
Pasco
Kennewick
McNary Res.
Walla Walla
Dayton
Asotin
Winchester
Cottonwood
Goldendale
The Dalles
Hood River
Pendleton
Milton
Freewater
Umapine
Ferndale
Athena
Weston
Helix
Adams
Hermiston
Umatilla
Irrigon
Boardman
Stanfield
Echo
Ordnance
Arlington
Rufus
Biggs
Wasco
Moro
Grass Valley
Kent
Condon
Mayville
Fossil
Heppner
Lexington
Ione
Morgan
Cecil
Hardman
Eightmile
Parkers Mill
Lonerock
Kinzua
Shaniko
Antelope
Clarno
Madras
Metolius
Culver
Opal City
Terrebonne
Redmond
Prineville
Powell Butte
Bend
Millican
Brothers
Hampton
Paulina
Post
Roberts
Mitchell
Spray
Service Creek
Richmond
Waterman
Antone
Kimberly
Monument
Dayville
Mt. Vernon
John Day
Canyon City
Prairie City
Austin
Bates
Seneca
Izee
Silvies
Burns
Hines
Lawen
Crane
Harney
Riley
Wagontire
Narrows
Princeton
Diamond
Frenchglen
Blitzen
Andrews
Fields
Denio
La Grande
Elgin
Imbler
Cove
Union
Island City
Summerville
Telocaset
North Powder
Baker
Haines
Sumpter
Unity
Huntington
Richland
Halfway
Enterprise
Joseph
Wallowa
Lostine
Imnaha
Ontario
Payette
Weiser
Vale
Nyssa
Adrian
Juntura
Harper
Brogan
Jamieson
Westfall
Riverside
Crowley
Rockville
Sheaville
Jordan Valley
Danner
Arock
Rome
Owyhee
Caldwell
Nampa
Emmett
Council
Fort Rock
Silver Lake
Summer Lake
Paisley
Valley Falls
Lake Abert
Plush
Hart Lake
Adel
Lakeview
West Side
New Pine Creek
Goose Lake
Quartz Mountain
Bly
Bonanza
Alturas
Cowhead Lake
Upper Lake
Middle Alkali Lake
Lower Lake
Mud Lake
Alkali Lake
Massacre Lake
Summit Lake
Alvord Lake
Tumtum Lake
Malheur Lake
Harney Lake
Silver Lake
Steens Mountain

OREGON—*Continued*

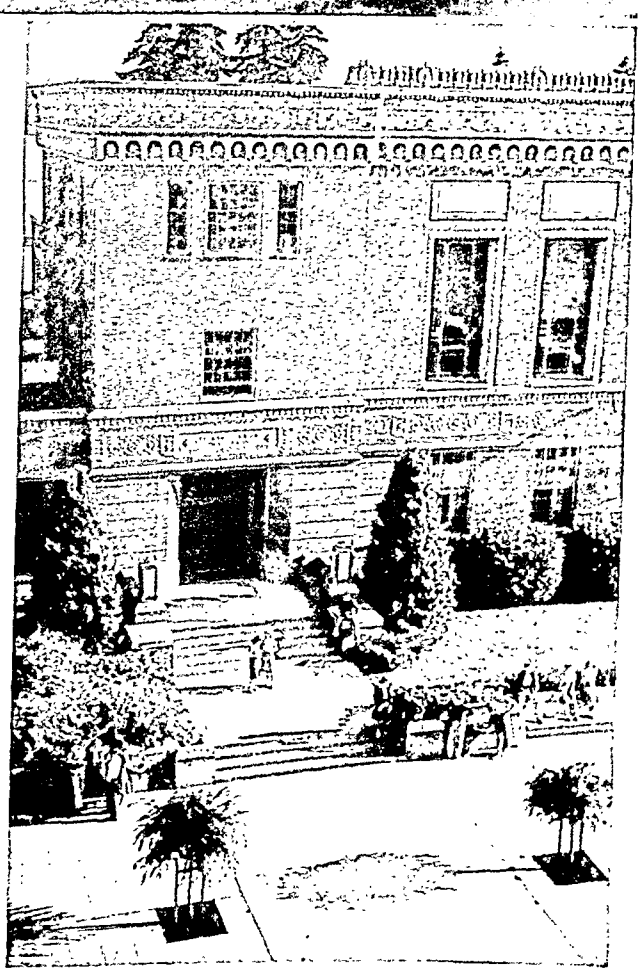
Kings Valley	210	D 3
Kinzua	900	H 3
Kirk	25	F 5
Klamath Agency	150	F 5
Klamath Falls	15,875	F 5
Klondike	6	G 2
Knappa	100	D 1
La Grande	8,635	J 2
La Pine	250	F 4
Lacomb	100	E 3
Lafayette	662	A 2
Lake Grove	4,000	B 2
Lakecreek	30	E 5
Lakeside		C 4
Lakeview	2,831	G 5
Langlois	65	C 5
Latourell Falls	72	E 2
Laurel	30	A 2
Lawen	15	J 4
Leaburg	106	E 3
Lebanon	5,873	E 3
Leland	71	D 5
Leona	50	D 4
Lewis	2	K 2
Lexington	237	H 2
Liberal	40	B 3
Liberty		A 3
Lime	100	K 3
Lincoln Beach	100	C 3
Linneman	550	B 2
Linnton		A 2
Linslaw	75	D 4
Logan	50	B 2
Logdell	4	H 3
Logsden	340	D 3
London		D 4
Lonerock	38	H 2
Long Creek	288	H 3
Lookingglass	100	D 4
Lostine	178	K 2
Lowell	700	E 4
Lyons	600	E 3
Mabel	85	E 3
Macksburg	50	B 3
Macleay	25	A 3
Madras	1,258	F 3
Malheur	25	K 3
Malin	592	F 5
Manhattan Beach		D 2
Manning	100	D 2
Manzanita	339	C 2
Mapleton	1,016	C 3
Marcola	800	E 3
Marial	45	D 5
Marion	200	D 3
Marquam	70	B 3
Marshland	120	D 1
Maupin	312	F 2
Maxville		K 2
Mayger	95	D 1
Mayville	102	G 2
McCoy	75	D 2
McCredie Springs	87	E 4
McEwen	25	J 3
McKee	75	A 3
McKenzie Bridge	195	E 3
McKinley	155	D 4
McMinnville	6,635	D 2
McNary		H 2
Meacham		J 2
Medford	17,305	E 5
Medical Sprs.	15	K 2
Mehama	200	E 3
Melrose	150	D 4
Merlin	225	D 5
Merrill	835	F 5
Metolius	157	F 3
Metzger	2,000	A 2
Middleton	150	A 2
Midland	85	F 5
Mikkalo	150	G 2
Mill City	1,792	E 3
Miller	75	G 2
Millican	5	F 4
Millington	300	C 4
Milo	300	E 5
Milton	2,362	J 2
Milwaukie	5,253	B 2
Minam		K 2
Minerva	25	C 3
Mission	200	J 2
Mist	269	D 1
Mitchell	415	G 3
Modoc Point	100	F 5
Mohawk	20	E 3
Mohler	100	D 2
Molalla	1,497	B 3
Monitor	50	B 3
Monmouth	1,956	D 3
Monroe	362	D 3
Monument	228	H 3
Morgan	10	H 2
Moro	359	G 2
Mosier	259	F 2
Mt. Angel	1,315	B 3
Mt. Hood	59	F 2
Mt. Vernon	451	H 3
Mountaindale	50	A 1
Mowich	20	F 4
Mulino	275	B 2
Multnomah	5,000	B 2
Murphy	50	D 5
Myrtle Creek	1,781	D 4
Myrtle Point	2,033	C 4
Narrows	7	H 4
Nashville	25	D 3
Needy	50	B 3
Nehalem	270	D 2
Nelscott	400	D 3
Neotsu	300	C 2
Neskowin	120	D 2
Netarts	500	C 2
New Bridge	51	K 3
New Era	100	B 2
New Pine Cr.	200	G 5
Newberg	3,946	A 2
Newport	3,241	C 3
North Bend	6,099	C 4
N. Junction	2	G 3
N. Plains	600	A 2
N. Portland	340	B 1
N. Powder	403	K 2
Norway	250	C 4
Nyssa	2,525	K 4
Oak Grove	2,000	B 2
Oakland	829	D 4
Oakridge	1,562	E 4
O'Brien	265	D 5
Oceanlake	700	C 3
Oceanside	150	C 2
Odell	350	F 2
Odell Lake	50	F 4
Olene	35	F 5
Olex	168	G 2
Olney		D 1
Ontario	4,465	K 3
Opal City		F 3
Ophir		C 5
Ordnance		H 2
Oregon Caves	2	D 5
Oregon City	7,682	B 2
Orenco	313	A 2
Oretown	60	D 2
Oswego	3,316	B 2
Otis	200	D 2
Otter Rock	100	C 3
Owyhee Corner		K 4
Pacific City	200	C 2
Paisley	214	G 5
Palmer Junction	3	K 2
Paradise	42	K 2
Park Place	500	B 2
Parkdale	300	F 2
Parkers Mill		H 2
Parkrose	3,800	B 2
Paulina		G 3
Pedee	125	D 3
Pendleton	11,774	J 2
Pengra		E 4
Peoria	76	D 3
Perry	125	J 2
Perrydale	75	D 2
Phillips	3	A 2
Philomath	1,289	D 3
Phoenix	746	E 5
Pilot Rock	847	J 2
Pine	73	K 3
Pinehurst	6	E 5
Pistol River	100	C 5
Placer	48	D 5
Plainview	20	D 3
Pleasant Valley	30	K 3
Plush	110	H 5
Pondosa	150	K 2
Port Orford	674	C 5
Portland	373,628	B 2
Post		G 3
Powell Butte	661	G 3
Powell Valley	725	B 2
Powers	895	D 5
Prairie City	822	J 3
Pratum	44	A 3
Prescott	119	D 1
Princeton	6	J 4
Prineville	3,233	G 3
Pringle	250	A 3
Promise		K 2
Prospect	500	E 5
Prosper	55	C 4
Provolt	200	D 5
Quartz Mountain	12	G 5
Quinaby	100	A 3
Quincy	400	D 1
Rainbow	65	E 3
Rainier	1,285	E 1
Rainrock		C 3
Redland	50	B 2
Redmond	2,956	F 3
Reed		D 3
Reedsport	2,288	C 4
Reedville	250	A 2
Remote	60	D 5
Rex	5	A 2
Richland	220	K 3
Richmond		H 3
Rickreall	150	D 3
Riddle	634	D 5
Rieth	325	J 2
Riley	5	H 4
Ritter	107	H 3
Riverside	38	J 4
Riverton	125	C 4
Roberts		G 3
Robinette	20	L 3
Rockaway	1,027	C 2
Rockcreek	19	G 2
Rockton	150	A 2
Rockville	31	K 4
Rocky Point		A 1
Rogue River	590	D 5
Rome	50	K 5
Roosevelt Beach		C 3
Rose Lodge	150	D 3
Roseburg	8,390	D 4
Rowena	75	F 2
Rowland	15	D 3
Roy	48	A 2
Ruch	50	E 5
Rufus	50	G 2
Rye Valley	25	K 3
Saginaw		E 4
St. Benedict	230	B 3
St. Helens	4,711	E 2
Saint Louis	50	A 3
Saint Paul	226	A 3
Salado	12	D 3
SALEM	43,140	A 3
Sams Valley		E 5
Sandlake	300	C 2
Sandy	1,003	E 2
Scappoose	659	E 2
Scholls	70	A 2
Scio	448	E 3
Scofield	75	D 2
Scotts Mills	217	B 3
Scottsburg	100	D 4
Seal Rock	330	C 3
Seaside	3,886	D 2
Selma	125	D 5
Seneca	760	J 3
Service Creek	13	G 3
Shaniko	61	G 3
Shaw	150	A 3
Sheaville	64	K 4
Shedd	165	D 3
Shelburn	20	E 3
Sheridan	1,922	D 2
Sherwood	575	A 2
Shevlin	600	F 4
Siletz	570	D 3
Siltcoos	28	C 4
Silver Lake		F 4
Silverton	3,146	A 3
Silvies		H 3
Simnasho	40	F 3
Siskiyou	50	E 5
Sisters	723	F 3
Sitkum	50	D 4
Sixes	250	C 5
Sodaville	157	E 3
South Junction	10	G 3
Southbeach	300	C 3
Sparta	25	K 3
Sprague River	350	F 5
Spray	375	H 3
Springbrook	500	A 2
Springfield	10,807	E 3
Springwater	300	E 2
Stanfield	845	H 2
Star		E 4
Starkey	30	J 2
Stauffer	2	G 4
Stayton	1,507	E 3
Sublimity	367	E 3
Summer Lake	3	G 5
Summerville	73	K 2
Summit	250	D 3
Sumner	141	C 4
Sumpter	146	J 3
Sunny Valley	79	D 5
Susanville	9	J 3
Sutherlin	2,230	D 4
Svensen	100	D 1
Sweet Home	3,603	E 3
Swisshome	500	D 3
Sycamore		B 2
Sylvan	1,500	B 2
Table Rock	200	E 5
Taft	450	C 3
Takilma	50	D 5
Talent	739	E 5
Tallman	25	E 3
Tangent	200	D 3
Telocaset	80	K 2
Tenmile	40	D 4
Terrebonne	198	F 3
The Dalles	7,676	F 2
Thompson	3	K 3
Thurston	66	E 3
Tidewater	100	D 3
Tiernan	200	C 3
Tigard	800	A 2
Tillamook	3,685	D 2
Tiller	150	E 5
Timber	300	D 2
Toledo	2,323	D 3
Tolovana Park		C 2
Top	27	H 3
Trail	45	E 5
Trent	300	E 4
Troutdale	514	E 2
Troy	150	K 2
Tualatin	248	A 2
Tumalo	50	F 3
Turner	610	E 3
Twin Rocks	300	C 2
Tygh Valley	449	F 2
Ukiah	300	J 2
Umapine	50	J 2
Umatilla	883	H 2
Umpqua	20	D 4
Union	1,307	K 2
Union Creek	100	E 5
Unity	212	J 3
Vale	1,518	K 4
Valley Falls	14	G 5
Valsetz	60	D 3
Van	5	J 4
Vaughn	200	D 3
Venator	28	J 4
Veneta	750	D 3
Verboort	125	A 2
Vernonia	1,521	D 2
Vida	250	E 3
Viento	50	F 2
Viola	50	B 2
Waconda	50	A 3
Wagontire	3	H 4
Waldport	689	C 3
Walker	100	D 4
Wallowa	1,055	K 2
Walterville	100	E 3
Walton	70	D 3
Wamic	125	F 2
Wapinitia	20	F 2
Warm Springs	350	F 3
Warren	81	E 2
Warrendale	50	F 2
Warrenton	1,896	C 1
Wasco	305	G 2
Waterloo	180	E 3
Waterman		H 3
Wauna	325	D 1
Weatherby	25	K 3
Wecoma Beach	350	C 3
Wedderburn	250	C 5
Welches	119	E 2
Wemme	109	E 2
Wendling	124	E 3
West Linn	2,945	B 2
West Portland	3,000	B 2
West Salem		A 3
West Side	16	G 5
W. Woodburn	150	A 3
Westfall	3	K 3
Westfir	1,200	E 4
Westlake	180	C 4
Weston	679	J 2
Westport	600	D 1
Wheeler	291	D 2
Wheeler Heights	125	C 2
Whiteson	200	D 2
Whitney	3	J 3
Wilark	10	D 2
Wilbur	150	D 4
Wilderville	300	D 5
Wilhoit	5	B 3
Wilkesboro	45	A 2
Willamette		B 2
Willamina	1,082	D 2
Williams	100	D 5
Willowcreek	300	K 3
Willowdale	35	G 3
Willows	100	G 2
Wilsonville	162	A 2
Wimer	100	D 5
Winchester	300	D 4
Winchester Bay	500	C 4
Wing		K 3
Winlock	12	H 3
Wolf Creek	250	D 5
Wonder	300	D 5
Woodburn	2,395	A 3
Woods	110	C 2
Worden		F 5
Wyeth	15	F 2
Yachats	300	C 3
Yamhill	539	D 2
Yamsay Station		F 4
Yaquina	76	C 3
Yoder	150	B 3
Yoncalla	626	D 4
Zigzag	150	F 2
Zumwalt	2	L 2

*No room on map for name.

CAPITOL AND UNIVERSITY LIBRARY



The State Capitol at Salem (above) replaces the old building destroyed by fire in 1935. It is modern in design, with the low, symmetrical façade surmounted by a cylindrical dome. Above the dome rises a heroic figure, 'The Pioneer.' The library of the state university at Eugene (right) was built in 1936.



There were, however, many sharp struggles over the title to the Oregon country. It was contested by both Russia, which then held Alaska, and Great Britain, whose fur-trading companies had early established posts in the region. In the War of 1812 John Jacob Astor's trading station at Fort Astoria, near the mouth of the Columbia, was acquired by the British. In 1824 Russia agreed to limit its claims to the territory lying north of latitude 54° 40′; and in 1827 an earlier agreement was renewed with Great Britain for joint occupation of the whole coast south of the Russian line. Not until 1846, after a loud popular campaign for "Fifty-four forty or fight," did American and British statesmen arrive at the sensible conclusion to settle the "Oregon question" by dividing Oregon country, on the line of the 49th parallel, which already separated the possessions of the two countries east of these mountains. In 1848 the American Oregon Territory (including what is now embraced in the states of Oregon, Washington, Idaho, and parts of Wyoming and Montana) was formed. In 1859 Oregon became a state with its present boundaries.

The "Father of Oregon"

In the early period of Oregon history the Hudson's Bay Company played a prominent part, and there is no more picturesque scene than that of old Fort Vancouver (now Vancouver, Wash.), where Dr. John McLoughlin, Scotch Canadian, held sway for that company from 1824 to 1844. Irascible, dominating,

the "father of Oregon" reigned like a prince in his fortress, with palisade, watch towers, and constant sentinels. This same post was the great market for the western fur trade. Most important of all, Dr. McLoughlin extended hearty welcome to all settlers.

In 1832, four Flathead Indians from Oregon reached St. Louis, asking for the white man's "Book of Heaven" —the Bible. Soon Jason Lee, Dr. Marcus Whitman, and other missionaries were dispatched to Oregon. It was Dr. McLoughlin who helped them settle in the Willamette Valley. Then Whitman made a trip to the East and returned with an immigrant train of 200 covered wagons (*see* Oregon Trail). The 900 settlers were trapped by cold and hunger in the Cascades. Dr. McLoughlin rescued the exhausted travelers. When the Hudson's Bay Company demanded of the doctor on what authority he was extending aid to American immigrants, he replied curtly that the laws of humanity sufficed in such an emergency. The upshot was that he resigned his post, was naturalized an American, and went to Oregon City.

The gold fever of 1849 swept Oregon and opened up mines in the hills of the area around the Rogue and the Umpqua rivers, around Baker City, and also in the hills of the Willamette Valley and on the Santiam River. Here, in the brittle quartz, are still found pockets of arborescent gold in filaments and sticks.

Forty Years of Indian Strife

For more than 40 years the miners and other settlers engaged in wars with the Indians who were led by such men as Chief Kamiakin and Chief Joe. These wars lasted until the Paiutes and Bannocks were put down in 1880. During the Civil War, Oregonians who joined the Union forces included Joseph Hooker and Philip Sheridan, who won fame as "fighting generals."

Oregon's history since has been one of peace. It is ever grateful, however, to the pioneers, who "must blaze a nation's way with hatchet and with brand." (*See also* chronology in Oregon Fact Summary; United States, sections "Western Basins and Plateaus" and "North Pacific Region.")

Oregon Trail. "The grass is up!" Each spring in the 1840's and 1850's the excited shout arose from emigrants camped at "the big bend" of the Missouri River. When the prairie began to show green, they rushed to head their wagon trains northwest to "the Oregon country." From four to six months, these men, women, and children would plod some 2,000 miles of wilderness route called the Oregon Trail.

The Trail was a mingling of paths discovered by explorers, traders, and missionaries. Lewis and Clark blazed the way in 1804 (*see* Lewis and Clark Expedition). In 1811 frontiersmen of the Pacific Fur Company followed the Missouri River from St. Louis to the Arikara Indian villages in South Dakota. They struck across the plains through Idaho and Oregon. This route later became a part of the Oregon Trail.

Another section was added in 1812 by the eastward trek of a Pacific fur party which took a more southerly route, descending the Sweetwater and Platte rivers to the Missouri. In 1824 Thomas Fitzpatrick, a trapper, discovered South Pass, the lowest crossing over the Continental Divide. This became the Trail's chief gateway through the Rocky Mountains.

First Missionaries on the Oregon Trail

In 1834 the first missionary group, led by Jason Lee, pushed west from St. Louis, with a party headed by Nathaniel Wyeth. They largely followed the Platte River. At the Snake River Wyeth built a post, Fort Hall. This was later bought by the Hudson's Bay Company and became an important supply outpost for emigrants on the Trail. In 1836 Dr. Marcus Whitman and the Rev. Henry Spalding and their wives reached Oregon (*see* Whitman, Marcus). Their wives were the first white women to make the journey.

Both Jason Lee and Dr. Whitman returned to the East to persuade people to settle in Oregon. Enthusiasts in Lynn, Mass., organized an Oregon Emigration Society in 1838. Similar societies grew in other states. But few yet dared the journey, for the Oregon Trail was still only a loose network of wilderness paths.

EMIGRANT DAYS ON THE OREGON TRAIL



Fur traders built Fort Laramie on the Oregon Trail in eastern Wyoming on the junction of the North Platte and Laramie rivers in 1834.

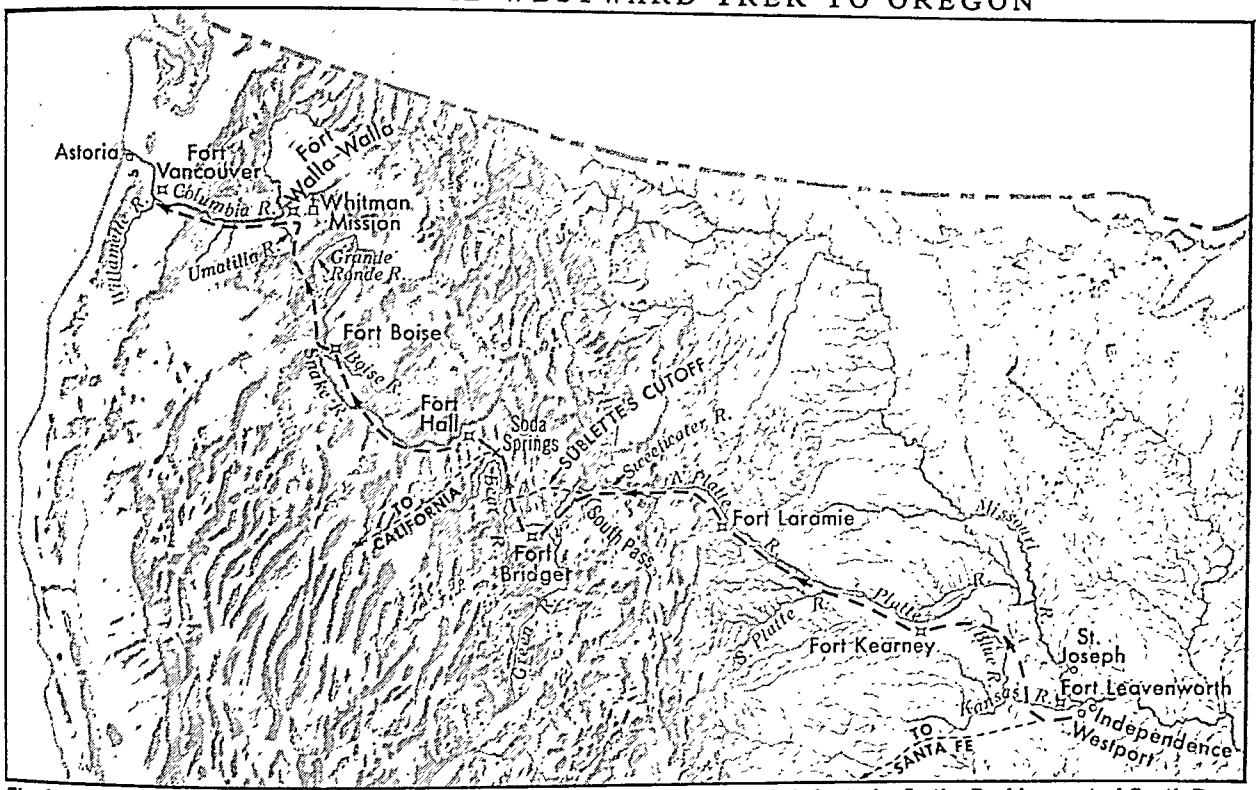


Also on the Oregon Trail in the southwestern part of Wyoming was Fort Bridger. The daring fur trader Jim Bridger erected it in 1843.



Here emigrants on the Oregon Trail, in 1849, repel an Indian attack. Even the women joined in the fight for their lives and possessions.

ROUTE OF THE WESTWARD TREK TO OREGON



The Oregon Trail ran close to rivers where water was available for emigrants and their stock. In the Rockies west of South Pass, Sublette's Cutoff saved some 50 miles, but it lacked water. The destination of most of the settlers was the Willamette Valley.

But the United States kept looking westward. In 1842 John C. Frémont, of the United States Topographical Corps, led a government exploring party to Wind River valley. His report and his maps then helped greatly to shape the network of paths into the Oregon Trail (*see* Frémont).

This became the chief route to the Northwest because it furnished water, easy fordings, pasturage, and low passes through the mountains. The wagon teams had to be watered twice a day and the loose stock at least once. Yet wagon trains could not cross several streams a day, as deep water meant long hours of unloading and reloading wagons, and even crossing many shallow fords took precious time in a daily march.

The ideal wagon train route went *along* a river. The Oregon Trail did. The map on this page shows how it began in Missouri at Independence and Westport on "the big bend" of the Missouri River. From there it struck west to the Blue River to its junction with the Platte. The trail then followed the south bank of the Platte, the river once described as "a thousand miles long and six inches deep." A branch of the Platte, the Sweetwater, carried the Trail to South Pass in Wyoming. The Bear and Boise rivers and the "cursed mad" Snake River then led to the mighty Columbia (*see also* Far West).

Emigrants gathered in April and May at Independence, Westport, and St. Joseph. The sprawling camps bustled as sunbonneted women and booted men made last preparations for the long trek. Men repaired their wagons and gear, greased axles, bolted new iron tires and strengthened wagon beds.

They had to travel light, yet carry enough to meet all their needs. To save weight, they were advised to take little furniture and "no useless trumpery." Typical emigrant tools included an ax, shovel, saw, augurs, and "a good supply of rope." Farmers were advised to also take "a few plow moulds." Many a wagon carried a sheet-iron stove fastened to a rear platform.

The plains offered ample game and wild fowl, but emigrants also had to take staple food. An experienced leader declared: "For each adult, there should be 200 pounds of flour, 30 pounds of pilot bread, 75 pounds of bacon, 10 pounds of rice, 5 pounds of coffee, 2 pounds of tea, 25 pounds of sugar, half bushel of dried beans, one bushel dried fruit, 2 pounds of saleratus (baking soda), 10 pounds of salt, half a bushel of cornmeal. And it is well to have a half bushel of corn, parched and ground. A small keg of vinegar should also be taken."

In addition a family carried a water keg usually of 8 or 10 gallons, a Dutch oven, and a churn or two. Boxes built into the wagon bed held boots, clothing, blankets, and often a feather bed. Many also held "a good supply of school books for the children."

Many loaded covered wagons weighed from 3,000 to 7,000 pounds. Several strong animals were needed to pull the lurching, creaking prairie schooners. Teams were made up of 10 or 12 horses or mules or six yoke of oxen, and every emigrant needed several more in reserve to replace lame or worn-out animals. Smaller wagons of about 2,500 pounds, drawn by one yoke of oxen, would often have three reserve yokes. Though

slower than horses or mules, oxen proved better for the trail. They could graze on rougher stuff than horses and they seldom strayed. Wise emigrants used oxen from "four to six years old, tight and heavy made."

Wagon trains organized themselves into a *company*, with a captain. In the 1840's there was comparatively little danger of attacks by Indians. But the unwieldy emigrant trains needed skilled guidance and discipline to make the long journey efficiently. The captain assigned each wagon its position in line, drawn by lot, and named outriders and pickets.

At a bugle call at six o'clock in the morning, the train prepared for the day's march, which was usually from 15 to 20 miles. Wagons wheeled into line. The older boys tramped afoot, herding the loose stock. Often the women and smaller children, tired of jolting and swaying, would spell the herders. A skilled captain paced the march to bring the wagons to good pasture and water at "nooning" and before sundown.

The trek was hard, yet emigrants in well-organized trains were generally in excellent health, and they had their good times. Many evenings, around the fires in the wagon circle, groups held sings. Families visited and enjoyed "socials." Emigrants got into serious trouble usually only when they stubbornly left the wagon train, seeking short cuts. Not until 1848–49 did a deadly epidemic strike the Trail. In those years cholera brought death.

For years the Trail was the great artery to Oregon. The first emigrant train left Independence in 1842. In that year nearly 1,000 emigrants followed the Trail. In 1843 they were followed by more, of whom 875 went all the way to Oregon. Those who reached Oregon in 1844 numbered about 1,400; in 1845, more than 3,000. Although the transcontinental rail lines met in Utah in 1869, emigrants used the Trail as late as 1880.

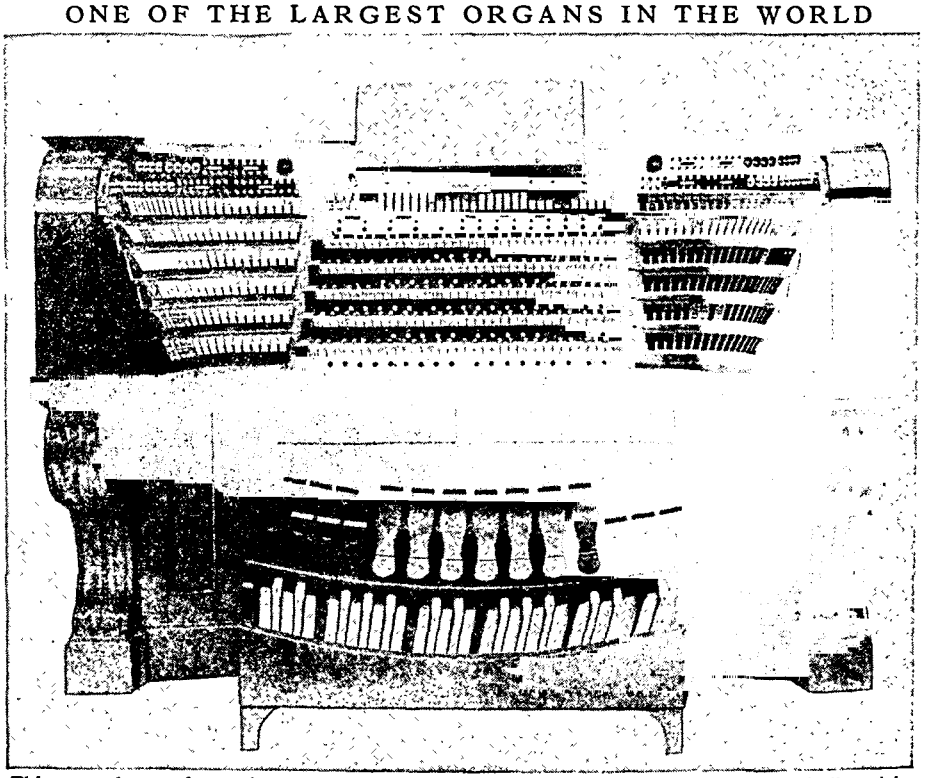
Today automobile roads follow the main course of the historic Trail and its many alternate sweeps, made by different wagon trains. Often trains would drive off the main course to avoid deep ruts or polluted camp grounds or blinding dust. Sometimes the Trail spread 20 miles wide in faint paths over the prairie. The Mormon Trail largely follows the same route, except it usually winds along the north bank of the Platte. The Overland Trail branches from the Oregon Trail at the juncture of the North Platte and South Platte rivers, striking a short cut to Fort Bridger.

ORGAN. Only a small part of a pipe organ can ordinarily be seen. The pipes of even a small organ take up so much room that they are usually enclosed in a separate room and are heard through a screen or grille. The pipes above the console of an organ are often dummies used for ornamental purposes.

There are hundreds and sometimes thousands of pipes in an organ. Pipes as large as the trunks of full-grown trees produce the deepest tones. Others smaller than a lead pencil give out the highest notes. The pipes are arranged in chromatic series, or *stops*. All the pipes of a stop produce tones of the same timbre. The stops are given names and in some cases imitate instruments of the orchestra, such as the oboe and clarinet. Some stops are composed of wood pipes, others of metal. The "reed" stops are made up of pipes constructed like a clarinet or saxophone.

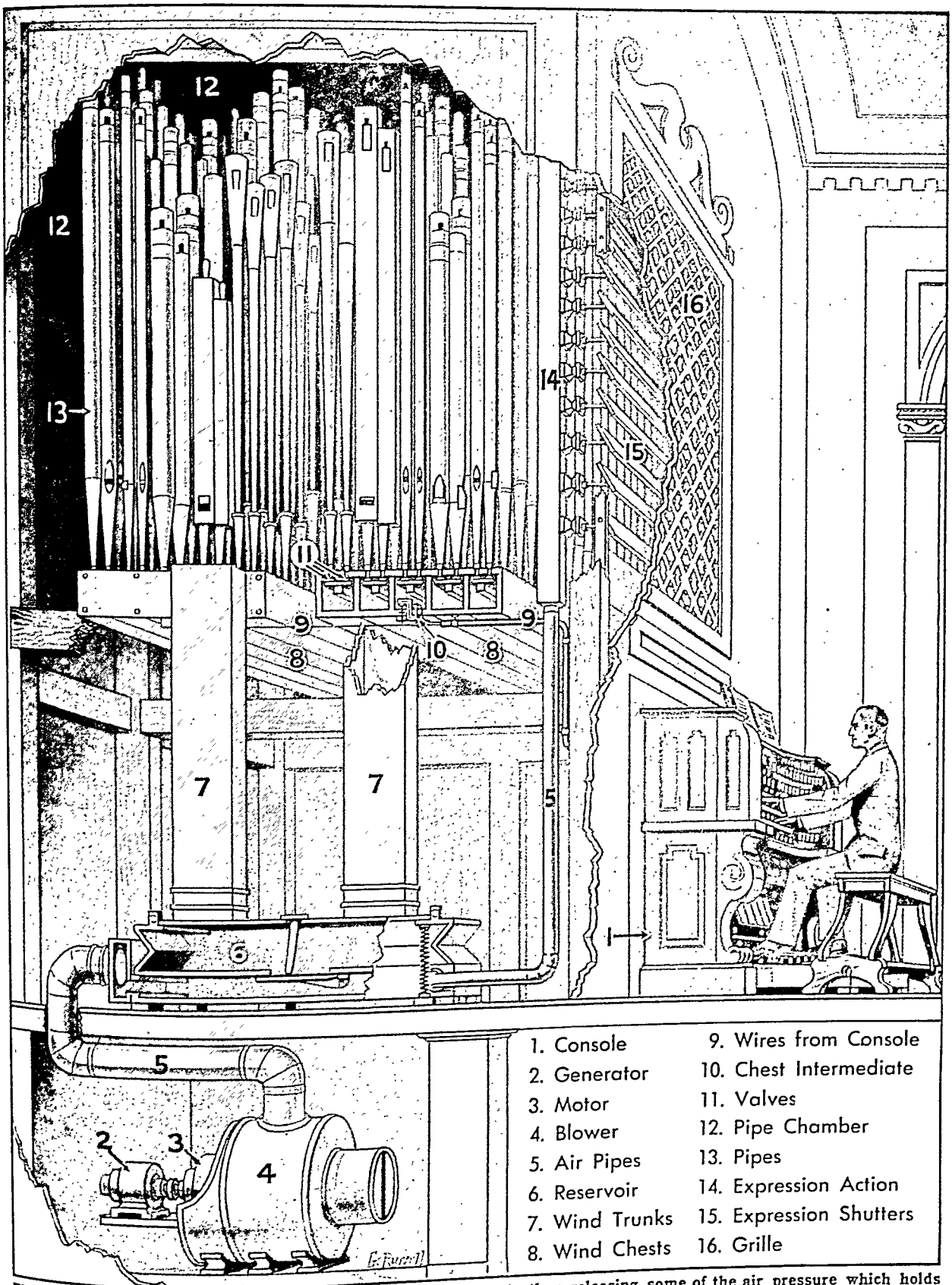
Each stop is controlled by a stop knob or tilting tablet placed within reach of the organist. When he wishes to use a stop, he pulls the knob and thus connects it with the keyboard. The air that causes the pipes to sound is supplied by an electric blower.

ONE OF THE LARGEST ORGANS IN THE WORLD



This organ has no fewer than 18,000 pipes and 232 stops. The entire organ, pipes and all, weighs 375,000 pounds; the heaviest single pipe weighs 1,735 pounds and is 32 feet long. The longest pipe is 37 feet 9 inches long and 17 inches in diameter. The smallest pipe is three fourths of an inch long and weighs about half an ounce. This musical giant, which stands in a Philadelphia department store, is really made up of eight "organs": great, choir, swell, solo, echo, chorus, ethereal, and pedal. In addition it has a piano, two sets of chimes, one set of gongs, and a harp, all of which are controlled by this one set of keyboards and stops.

HOW THE PIPE ORGAN OPERATES



1. Console
2. Generator
3. Motor
4. Blower
5. Air Pipes
6. Reservoir
7. Wind Trunks
8. Wind Chests
9. Wires from Console
10. Chest Intermediate
11. Valves
12. Pipe Chamber
13. Pipes
14. Expression Action
15. Expression Shutters
16. Grille

When an organist sits down at the console (1) he turns on a switch, setting into action the motor (3) and, if direct current is not available, a generator (2). These activate a blower (4), forcing compressed air through air pipes (5), reservoir (6), and wind trunks (7) to fill wind chests (8). As he presses a key, electricity flows along a wire (9) and magnetizes the chest intermediate (10), causing it to lift a metal disk, thus releasing some of the air pressure which holds a valve (11) against the base of the pipe (13). The valve drops and air from the wind chest rushes up through the pipe, making it "speak" into the pipe chamber (12). Volume is governed by pedals connecting with the expression action (14), a series of valves which open and close the shutters (15). An ornamental grille (16) masks pipes and organ mechanism.

An organ of any size has at least two keyboards, or *manuals*, as well as a pedal keyboard. Each of these governs a particular group of stops; the groups are usually placed in separate rooms, each fitted with movable slatted shutters for controlling the volume. The most important manual governs the *great organ*, as this group of stops is termed. Above the great manual is the *swell* manual and below is the *choir* manual. If an organ is provided with other manuals, they are placed above the swell and are usually called *solo* and *echo*. The echo organ is in the rear of the auditorium. The pedal organ has its own stops; some of these sound one or more octaves lower than the corresponding notes of the manuals. *Couplers* on most organs interconnect the manuals. Thus the stops of the swell organ, for example, may be played from the great manual.

The oldest organlike instrument was the *syrinx*, or Pan pipes, of ancient Greece. Sets of pipes something like these were attached to an air pump and hydraulic air reservoir about 200 B.C. This was the *hydraulus*, or water organ, used in Roman circuses. Centuries later, bellows replaced the cylinder-and-piston pump as a source of air. A 10th-century organ in Winchester Cathedral, England, had a bellows so huge that 70 men were needed to pump it. Today turbine blowers furnish a constant supply of wind. Electric or electropneumatic devices open and close pipe valves and stop controls at a finger's touch.

In 1935 Laurens Hammond introduced a revolutionary type of pipeless *electric organ*. A synchronous motor turns a number of tone wheels, one for each fundamental note of the organ. Each wheel bears high spots that pass an electromagnet and generate electrical impulses having the frequency of the note (*see* Sound). Separate controls add impulses for overtones as desired. These various currents are then amplified through a loud-speaker. The overtone controls can be set to approximate the quality of the different stops of a pipe organ or to produce tones unlike those of any other instrument. A smaller chord organ is similarly constructed. The melody is played on a short keyboard with the right hand while buttons controlled by the left hand supply a chord accompaniment, as in the accordion.

Reed organs, or harmoniums, are often used in small churches. A reed organ has a great number of freely vibrating brass reeds like those of the harmonica. In small one-manual reed organs, air is provided by bellows worked by the feet. Larger types may have two manuals and a pedal keyboard. In these the wind is supplied by an electric blower.

The CHEMISTRY *of* CARBON *Compounds*

ORGANIC CHEMISTRY. Carbon unites with many elements to form a great variety of compounds that are found in a host of substances. Among the common substances are coal, petroleum, plant and animal tissues, foods, fabrics, plastics, and rubber. More than 600,000 carbon compounds have been isolated or synthesized; all the other elements together form less than 50,000 compounds. These substances containing carbon are called organic compounds; and the study of them is known as *organic chemistry*.

This name arose because chemists once thought that many of these compounds could be formed only by a vital force (a life process). This was disproved in 1828 when the German chemist Friedrich Wöhler converted the compound ammonium cyanate, NH_4CNO, into urea $(NH_2)_2CO$. Before this, urea had been known only as a product of life processes. Today chemists and chemical manufacturers can create many of the products which formerly had been produced only by living plants and animals.

Why the Host of Carbon Compounds Exists

Carbon (organic) compounds exist in such number and variety because of the chemical properties of carbon. Carbon has four valence electrons which form covalent bonds. And since carbon is in Group IVB of the Periodic Table, it appears to be "mid-way" between the metals and nonmetals and has the ability to react with both types of elements (*see* Carbon; Periodic Table). Carbon reacts as follows:

1. Carbon atoms have the unusual property of combining with each other to form rings or long chains. No other element does so as extensively.

2. Carbon will combine with many different atoms or groups of atoms. This property, together with ability to form long chains, makes carbon the most versatile of all elements in forming compounds.

3. Carbon forms many compounds that exist as *isomers*. Isomers are molecules with the same number and kinds of atoms, but in different arrangements—for example, CH_3CHCl_2 and CH_2ClCH_2Cl. The isomers have markedly different chemical properties.

The Huge Family of Hydrocarbons

The effects produced by these factors can be illustrated with the most simple organic compounds, called *hydrocarbons*—meaning compounds containing hydrogen and carbon only. This type of compound can be shown by *molecular* formulas (which state the kind and number of atoms in the compound) or by *structural* formulas. Structural formulas show the covalent bonds which hold the atoms together, with a short bar for each bond. In such a formula, each bar represents a *pair* of electrons; usually each atom concerned contributes "its end of the bond," as follows:

Electrons in the bond: $\overset{\rightarrow}{\underset{\leftarrow}{C:H}}$ The bond shown by a bar: $C—H$

Groups of atoms can also be combined by one or more covalent bonds. Such groups (sometimes called *radicals*) offer their ends of one or more covalent bonds for making compounds. Radicals from simple parent hydrocarbons are named by changing the ending of the name of the hydrocarbon from which they are derived, thus: meth*ane*, CH_4 (the hydrocarbon); meth*yl*, CH_3 (the radical). The three

simplest hydrocarbons (methane, ethane, propane) and the corresponding radicals or combining groups are shown at the right, using each type of formula. These hydrocarbons differ from each other only in the number of H–C–H units in the chain. The series runs up to $C_{60}H_{122}$. Isomerism appears with the hydrocarbon butane (C_4H_{10}).

The number of isomers increases with the number of carbon atoms in the molecule. Butane has one isomer; pentane (C_5H_{12}) has two; and so on. The isomers for butane and pentane are shown at the right, with their structural formulas. The formulas show that hydrocarbons of this type are "open chain" in structure and not closed chains, which would be called ring structures.

Hydrocarbons form many derivatives; that is, compounds in which the hydrogen atoms are replaced by other atoms or groups. Several methane derivatives at the right show such replacements. Isomers also form derivatives, thus adding to the host of compounds.

Hydrocarbons of the Benzene Type

Hydrocarbons of the open-chain type are found typically in petroleum. Coal tar is another important source of hydrocarbons; but most hydrocarbons from coal tar have the carbon arranged in rings rather than in chains. The rings usually have six carbon atoms. The simplest of these hydrocarbons is benzene (C_6H_6). The structural formulas of benzene and several derivatives are shown at the right. The importance of benzene and benzene derivatives can be judged by listing a few with their uses in modern life:

Benzene—a powerful solvent; usable for motor fuel
Toluene—used to make explosives such as trinitrotoluene (TNT)
Aniline—an important material for dyes
Phenol (carbolic acid)—a strong antiseptic
Salicylic acid—basis of drugs such as aspirin
Hydroquinone—photographic developer

These compounds with ring structure are called *aromatic* compounds, whereas those with chain structure are called *aliphatic* compounds.

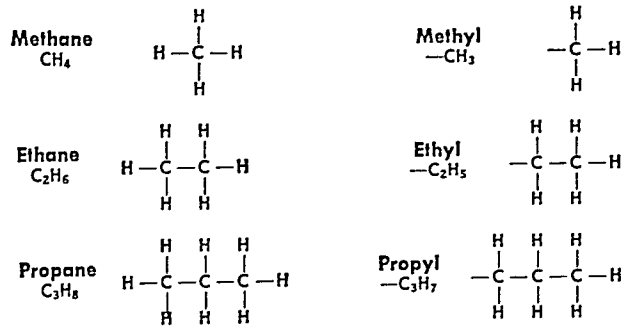
Compounds with Double and Triple Bonds

Aromatic compounds differ from many aliphatic hydrocarbons in the type of bonds which hold the molecules together. In a chain-structure molecule, such as methane, the carbon atom forms one bond (consisting of a shared pair of electrons) with each of four other atoms. In such situations, the carbon is said to be *tetravalent*. Since four is the largest number of atoms with which a carbon atom can join, such compounds are said to be *saturated*.

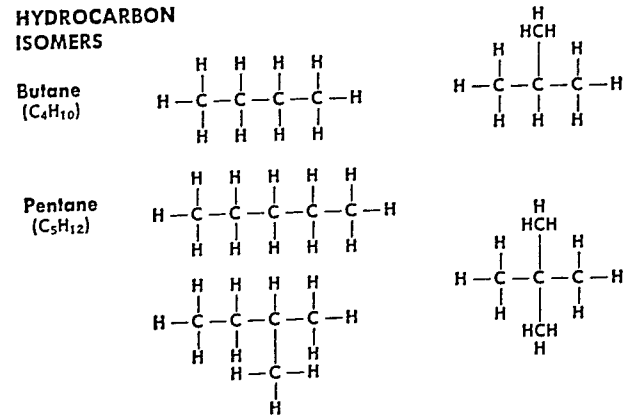
Benzene, however, has only six hydrogen atoms combined with six atoms of carbon. Each carbon atom therefore only uses one valence bond to hold a hydrogen atom. The other three bonds join with other carbon atoms to form the benzene ring, and every other bond between the carbon atoms must be double. To form this bond, the carbon atoms share *two* pairs of electrons, thus: C::C. A double bond can also be shown with bars: C=C. A triple bond can be shown with three bars: C≡C.

STRUCTURES OF ORGANIC COMPOUNDS

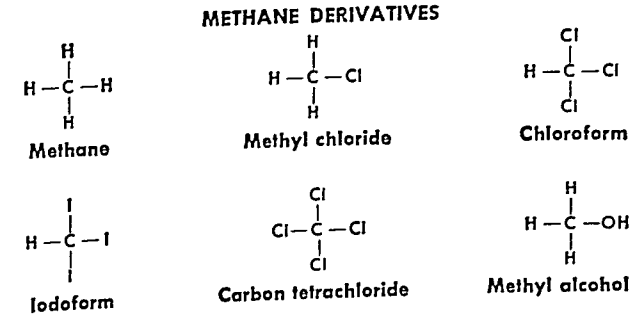
Below are the three simplest hydrocarbons, shown by formulas of molecular and structural type. The article explains these and other examples.



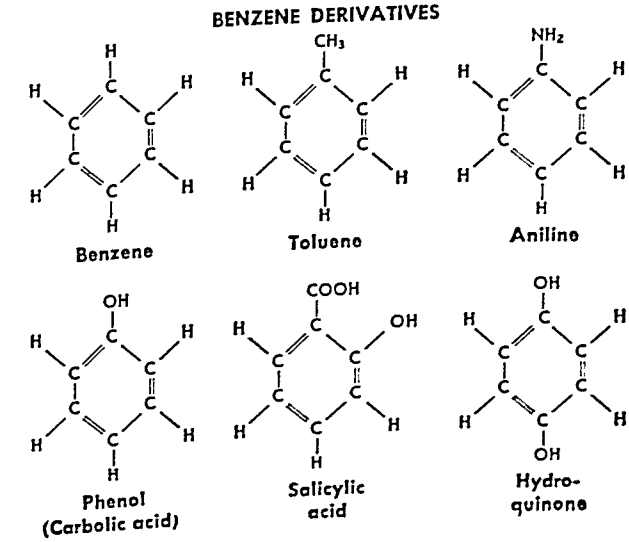
HYDROCARBON ISOMERS



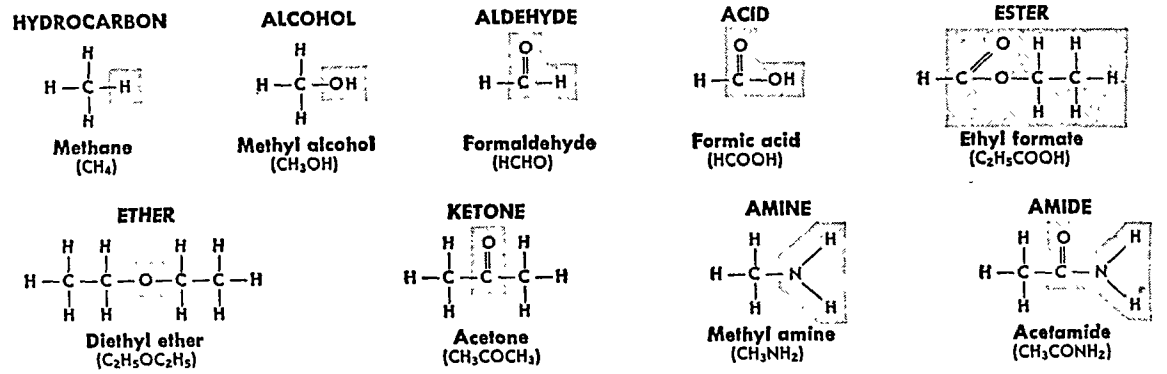
METHANE DERIVATIVES



BENZENE DERIVATIVES



THE LEADING FAMILIES OF ORGANIC COMPOUNDS



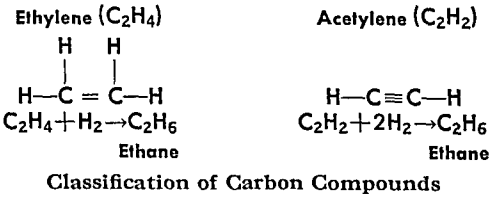
These are examples of the leading types of organic compounds. Each type has a characteristic grouping of atoms which identifies it; and all can be considered as derived from the hydro-carbon methane. For example, substitution of the hydroxyl group (—OH) for a hydrogen atom in a methane yields an alcohol. (This and other characteristic groups are marked by shading.)

Substitution of a double-bond oxygen atom for two hydrogen atoms of an alcohol gives an aldehyde: $\diagdown C{=}O \diagup$

The name "aldehyde" also suggests "alcohol less hydrogen," as comparison of the formulas will show.

Addition of another oxygen atom to an aldehyde yields an organic acid, with the characteristic group COOH; and an ester can be considered as a salt of an acid. In ethyl formate, for example, an ethyl group (C_2H_5) has been substituted for the hydrogen atom of the characteristic group of formic acid. Other characteristic groups are explained in the article.

Double bonds can occur in chain-type compounds as well as in those of the ring type. Compounds having such bonds are said to be *unsaturated,* because elements such as hydrogen, chlorine, and bromine can open the bonds and saturate the four carbon valences by adding atoms of these elements. Two unsaturated chain-type hydrogen carbons, ethylene and acetylene, are shown below, together with the end results of saturating them with hydrogen atoms:



Classification of Carbon Compounds

The chemist has organized the study of this great number of compounds of carbon in much the same way that he has organized the study of the elements; that is, by grouping them into families. He finds that all organic compounds can be grouped into a small number of families. Furthermore, these families can be considered to be derivatives of the hydrocarbon methane (CH_4).

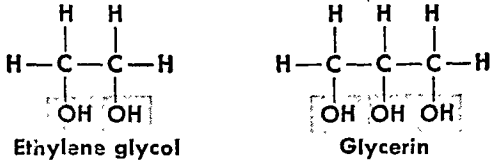
Just as a family of elements in the Periodic Table has similar properties, so does a family of organic compounds. This similarity arises from the properties of some characteristic group in each family. In the examples shown, the characteristic group is attached to the group called *methyl* (CH_3) in the alcohol, ketone, amine, and amide; with a hydrogen atom (H) in the aldehyde and acid. The *ethyl* groups (C_2H_5) are in the ether and ester. The characteristic group can react with the characteristic group of other compounds to form new compounds.

The organic chemist has learned how to use the properties of each characteristic group in making new compounds. Hence he can make many new derivatives of a given compound. Thus he is a sort of molecular architect. He can design almost any formula he wishes and then go into the laboratory and prepare the compound that corresponds to that formula.

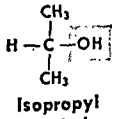
Many Kinds of Alcohols

Most people have heard of wood alcohol (CH_3OH), called methyl alcohol or *methanol;* and grain alcohol (C_2H_5OH), called ethyl alcohol or *ethanol.* Such simple alcohols have a carbon chain with the characteristic hydroxyl (—OH) group at one end, and H or a hydrocarbon radical at the other end.

Alcohols may have more than one OH group. Two examples of such alcohols are the following:



Ethylene glycol is called a *dihydric* alcohol, from the two OH groups. Glycerin is *trihydric.* Alcohols can also be of the *branched-chain* type, with hydrocarbon radicals at each side of the carbon chain instead of at one side, as in ethylene glycol or glycerin. An example is isopropyl alcohol, used as rubbing alcohol. It has the same molecular formula (C_3H_7OH) as the normal propyl alcohol. (*See also* Alcohol; Glycerin.)



Aldehydes, Ketones, and Ethers

Aldehydes are formed when alcohols are partially oxidized. The most familiar aldehyde is formaldehyde (HCHO), which is obtained from methyl alcohol. Formaldehyde is used as an embalming fluid, as an animal specimen preservative for biological work, as a disinfectant, and as an important raw material for the preparation of Bakelite and other plastics.

Ketones are formed when such branched-chain alcohols as isopropyl ($CH_3CHOHCH_3$) are partially oxidized. Removal of two hydrogen atoms leaves one carbon

atom united by a double bond to one oxygen atom, as in an aldehyde. Acetone (CH_3COCH_3) is one of the best-known ketones. Ketones are used as solvents for lacquers.

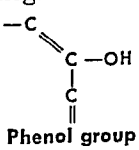
Ethers may be formed from two molecules of an alcohol in this manner:

$$\begin{matrix} C_2H_5OH \\ | \\ C_2H_5OH \end{matrix} + H_2SO_4 \rightarrow C_2H_5OC_2H_5 + H_2SO_4 \text{ (Hydrate)}$$

The sulfuric acid (H_2SO_4) removes a molecule of water (H_2O), shown by shading, and allows the C_2H_5 and C_2H_5O to join together, with $-O-$ in the middle. The best known ether is diethyl ether ($C_2H_5OC_2H_5$). Its chief use is as an anesthetic.

Two Types of Organic Acids

Organic acids are of two types. One has the COOH group (called the *carboxyl* group). An example is acetic acid (CH_3COOH), the acid in vinegar. It is made by oxidizing grain alcohol or by the fermentation of the fruit sugar in cider.


Phenol group

The other type has a *phenol* group, as in phenol (C_6H_5OH). Each type appears in salicylic acid (OHC_6H_4COOH), shown on an earlier page. Water solutions of each type are weakly acidic. The solutions can be neutralized with alkali; this forms salts of the organic acids.

Esters, Amines, and Amides

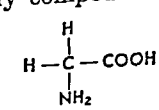
Ripe fruits owe their odors to the presence of *esters*. Some common esters formed with acetic acid (CH_3COOH) are found in the following list:

NAME	FORMULA	FOUND IN
Ethyl acetate	$CH_3COOC_2H_5$	.....
Butyl acetate	$CH_3COOC_4H_9$	bananas
Amyl acetate	$CH_3COOC_5H_{11}$	bananas
Octyl acetate	$CH_3COOC_8H_{17}$	oranges
Methyl butyrate	$C_3H_7COOCH_3$	pineapple

Amines are formed when a hydrogen atom is replaced with an NH_2 group. Simple replacements appear in such examples as methylamine (CH_3NH_2), from the aliphatic hydrocarbon methane, and aniline ($C_6H_5NH_2$), from the aromatic hydrocarbon benzene. *Amides* are formed when the $-OH$ of the carboxyl group in an organic acid is replaced—for example, acetamide (CH_3CONH_2). Both amines and amides are important intermediates in forming other compounds. For example, aniline is a basis for many dyes (*see* Dyes).

Compounds with Double-Acting Groups

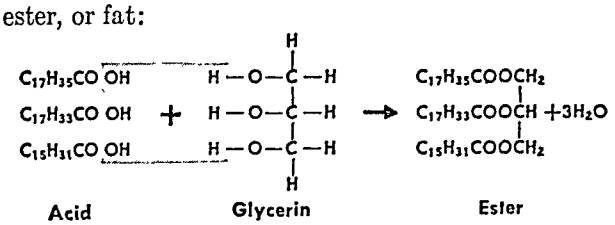
These "family" groups enter into a tremendous variety of combinations in plant and animal life and in a host of other chemical processes. Many of the combinations are possible because many compounds have more than one family group. A good example is *glycine*. Glycine is called an *amino acid* because it has both an acid group (COOH) and an amino group (NH_2) which acts as a base. Each group can combine with its chemical opposite. Thus glycine can join end to end with itself and with other basic or acidic compounds.


Glycine

As shown by formulas on an earlier page, salicylic acid has a carboxyl group (COOH) and a hydroxyl group (OH). Either or both groups can join with compounds in forming drugs or other compounds.

Chemical Characteristic of Fats

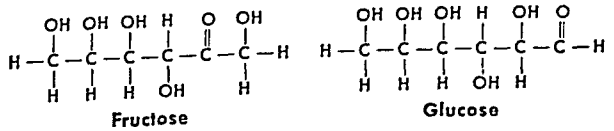
Many such combinations are found in the three great classes of foods—fats, carbohydrates, and proteins. *Fats* are esters of glycerin and higher acids such as palmitic ($C_{15}H_{31}COOH$), oleic ($C_{17}H_{33}COOH$), and stearic ($C_{17}H_{35}COOH$). A typical molecule of fat found in tallow shows with shading what has been removed from the acid and the glycerin to form the ester, or fat:



Treating the ester with a base (such as sodium hydroxide, NaOH) restores the glycerin and adds three Na ions to the acid radicals, giving three molecules of soap ($3C_{17}H_{35}COONa$) (*see* Soap). Such a process occurs in the upper intestines in digesting fats. The digestion products then move into the blood stream and are carried to the body cells to be resynthesized to body fats; or to be oxidized, producing carbon dioxide, water, and energy. In the oxidation process, fat produces twice the energy of carbohydrates or protein.

Sugar Base of Carbohydrates

The photosynthesis in plants affords a natural production of carbohydrates (sugars, starch, cellulose). By this process plant sugar ($C_6H_{12}O_6$) is formed from carbon dioxide and water (*see* Plant Life). The molecular formula can mean either of two simple sugars:



The total units H and OH are present in numbers sufficient to form six molecules of water ($6H_2O$); hence the name carbohydrates, meaning "hydrate of carbon." The molecules differ only in the position of the C=O unit. They both have several alcohol units, but glucose is an aldehyde and fructose is a ketone. If an OH is removed from one such molecule and an H from another, the molecules can join at the vacated bonds. The sugar sucrose ($C_{12}H_{22}O_{11}$), used for sweetening food, is formed in this way. (*See also* Glucose; Sugar.)

If 25 or 30 simple sugar units are joined, they form a molecule of starch $(C_6H_{10}O_5)_x$. A mass of 100 to 3,000 joined together is a molecule of cellulose $(C_6H_{10}O_5)_y$. (*See also* Cellulose; Starch.)

The Body-Building Proteins

The framework of all living cells and tissues is made of protein; and the many different kinds of protein are all made of amino acids linked together in long chains or large globules (*see* Proteins). The

amino acids are linked, as already explained for glycine, by means of the acidic COOH and the basic NH_2 radicals. Fats may also be included in cell tissue.

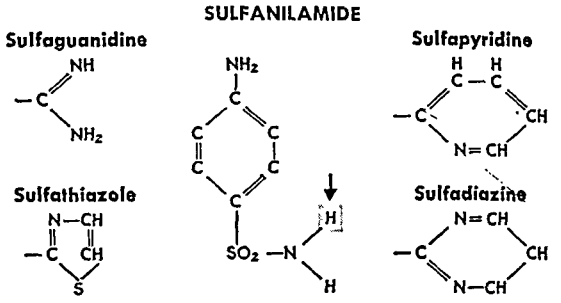
During digestion, proteins are broken down by enzymes into amino acids and other parts (*see* Digestion; Enzymes). These fragments are absorbed and recombined into body proteins as needed or they may be oxidized to supply energy.

Helpful Vitamins and Drugs

Body cells have the ability to absorb the digested fats, proteins (amino acids), and carbohydrates (glucose) and convert them into parts of the cell to replace damaged or worn portions or to build additional cells. To do this work properly, the cells require help from catalysts called vitamins (*see* Vitamins), which they cannot make.

The different vitamins act like so many "keys in locks" to conduct exchanges properly regardless of changes in the supporting liquid caused by variations in food supply or bodily state of health or disease (*see* Blood; Respiration).

Drugs likewise are helpful because they interact in definite chemical ways with tissues and the course of bodily processes. Because interactions are often so delicate, a slight variation in a drug molecule can have a profound effect upon its action. A good example of this is afforded by the group of sulfa drugs which are derived from the original sulfanilamide as follows:



Each sulfa at the right and left is made by substituting its chain for the H marked with an arrow in the parent drug, sulfanilamide.

Synthetics—Fibers, Plastics, and Rubber

Organic chemists have learned to produce a host of valuable synthetic substances. Generally the chemist selects a suitable molecule or molecules with double-acting properties and unites (*polymerizes*) them into larger groups called *polymers*. Among the products are fibers such as nylon and rayon (*see* Fibers; Nylon; Rayon). Other substances called *plastics* are molded or otherwise shaped into a host of objects (*see* Plastics). Another triumph of organic chemistry is the modern array of synthetic rubbers (*see* Rubber).

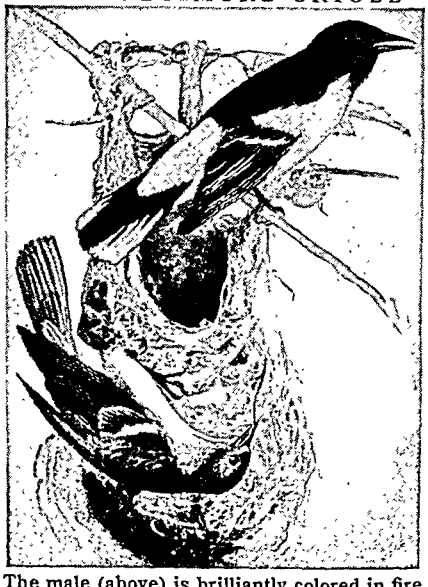
ORINOCO RIVER. Although Columbus saw the muddy waters of the Orinoco River staining the Gulf of Paria in 1498 and Diego de Ordaz explored the lower river in 1531, its source was still in dispute 400 years later. Over the centuries, explorers pushed past rapids and through rain forest toward the headwaters. In 1931, Dr. Herbert S. Dickey, an American, announced the location of the source stream. In 1951 Risquez Iribarren, a Venezuelan, disputed this finding and located the source 40 miles farther east.

From its source, the stream makes a broad curve to the northwest, where it forms the boundary between Venezuela and Colombia. Then it strikes eastward to the Atlantic and ends in a 700-square-mile delta west and south of Trinidad. Here some 36 channels thread through islands and mangrove swamp.

Important among its 436 sizable tributaries are the Guaviare, Meta, Apure, Arauca, Caura, and Caroni. The Casiquiare connects the Orinoco with the Rio Negro, a branch of the Amazon. Through it about one third of the waters of the region drain to the Amazon.

The length of the river is estimated at about 1,600 miles. With its branches it drains a basin estimated at 570,000 square miles. Ocean vessels can navigate it to the Caribbean Rapids, 700 miles from its mouth. The width, depth, and volume of the river vary tremendously through the year. In the summer rainy season, a swirling flood of muddy water may widen parts of the channel five miles or more. At such times the depth at Ciudad Bolívar, the river port, may increase by as much as 60 feet.

THE BALTIMORE ORIOLE



The male (above) is brilliantly colored in fire orange and black, with white on the wings. The female (clinging to nest below) is paler and olive tinged.

The drainage basin is thinly populated and only slightly developed. In the northern part, dry seasons of the year produce broad, grassy plains, called the *llanos*, used for cattle raising. To the south lie the Guiana Highlands, with a wealth of minerals largely untapped. Gold and diamonds have been mined in the Caroni Valley. Huge iron-ore deposits were developed by American steel interests after World War II. (*See also* Venezuela.)

ORIOLE. Among the most interesting nests built by birds is the one built by orioles. Baby orioles are hatched in a tightly woven sack of fibers which the female constructs on the tip of a high tree branch. The nest is quite safe because it

is so strongly woven that, although made for one summer only, it will swing securely on its leafless bough even through the storms of winter.

Included with meadowlarks, blackbirds, and others of the *Icteridae* family are about 40 species of orioles, distributed throughout temperate and tropical America. They feed on fruit, berries, and insects. The nesting habits are similar, though some nests are only semihanging. Orioles are not great singers, but all have sweet whistling calls. They breed from Nova Scotia and British Columbia to Mexico, and winter in Central America. The males are richly colored in orange, yellow, or chestnut, and black.

A favorite in eastern North America is the gorgeous orange and black Baltimore oriole. It is the state bird of Maryland. The orchard oriole, dark chestnut and black, ranges farther west and south. West of the Rocky Mountains, from Canada to Mexico, is the beautiful Bullock's oriole, also orange and black. In the Southwest are the hooded, Scott's, and Audubon's orioles. Old World orioles, though similar in color and habits, belong to another genus. The best known is the golden oriole. (For pictures in color, *see* Birds; Egg.)

The scientific name of the orchard oriole is *Icterus spurius;* of the Baltimore oriole, *Icterus galbula;* of Bullock's oriole, *Icterus bullocki;* of the hooded oriole, *Icterus cucullatus;* of Scott's oriole, *Icterus parisorum;* of Audubon's oriole, *Icterus melanocephalus;* of the golden oriole, *Oriolus oriolus.*

Ori'on. A mighty hunter of Greek legend, Orion was noted for his beauty and gigantic size and strength. According to the best-known story about him, Orion was loved by the goddess Artemis (Diana), whose hunter he became. Her brother Apollo was angered at this, and one day seeing Orion swimming he pointed out to Artemis a black object in the water and challenged her to hit it with her arrow. She shot at it, finding when too late that it was the head of her lover. After his death he was placed among the stars, where he appears with a lion's skin, girdle, sword, and club, followed by his hound. The constellation of Orion is one of the brightest in the northern heavens. The three bright stars across its center are called "Orion's belt."

Orkney Islands, Scotland. Like a fleet of ships sailing from Scotland up into the Arctic Ocean lie the 70 islands of the Orkneys. They are windy and treeless but noted for their bold and rocky scenery. For centuries these islands were the scene of many stirring events and bloody battles, for they were a natural stopping place for the Vikings in their voyages to the southwest. Their long black ships with monstrous figureheads visited their shores, carrying the bold warriors in their search for plunder and fame. The islands remained in the hands of the Northmen until 1468, when a needy king of Denmark pledged the Orkneys and Shetlands to James III of Scotland as security for his daughter's dowry. In default of payment they became Scottish territory, Denmark formally consenting to the transfer in 1590.

About half of the 70 islands are uninhabited. On the largest island, called Mainland, is Kirkwall, a town of 4,348 inhabitants. Other islands worthy of mention are Westray, Sanday, Stronsay, and Hoy, the last alone being mountainous and noted for its beautiful scenery. The inhabitants are largely descendants of the Northmen. On their small farms they raise oats, turnips, barley, and potatoes and tend their cattle, sheep, and poultry. Fishing is also a leading industry.

Scapa Flow, a large well-protected anchorage in the south of the group, was the chief naval base of the British Atlantic fleet in World War I. Here too the German fleet was interned after its surrender in 1918 and later sunk by its crews. Kirkwall, which lies at its northern angle, was the western base from which the stupendous task of laying the great North Sea mine barrage was accomplished, chiefly by American vessels. It later served as the base for the important and hazardous task of sweeping up the mines. Scapa Flow was again the chief base of the British Atlantic fleet in World War II. Area of the islands, 375 square miles; population (1951 census, preliminary), 21,258.

Orléans (*ôr-lā-än'*), France. Many historic memories cling to this old French town, situated at the northernmost bend of the Loire River, about 200 miles from its mouth and 75 miles southwest of Paris. It is the site of the ancient town of *Genabum,* which Julius Caesar laid in ruins when the Gauls rose against him in 52 B.C. The Roman city which arose here was named *Aurelianum* (probably in honor of the emperor Marcus Aurelius), whence the name "Orléans." It was important under the Franks and their successors, and its university (founded in 1309) became renowned as a center of learning in medieval and Renaissance days.

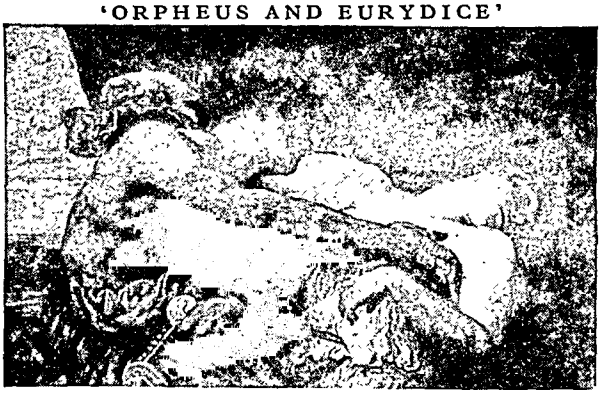
In the military history of France, Orléans has figured prominently. It is especially famous for its siege by the English during the Hundred Years' War, when it was relieved by Joan of Arc, the Maid of Orléans (*see* Joan of Arc). In the religious wars it was a center of Huguenot resistance. The Germans captured it in 1870. In World War II, after a heavy bombardment, it again fell to the Germans and was occupied by them from 1940 to 1944.

Modern Orléans has wide boulevards, squares, and river quays. Its varied manufactures include tobacco, blankets, hosiery, pins, wine, vinegar, agricultural implements, tools, machinery, and motor vehicles. It is also important as a railway center and a distributing point, but its chief interest is in its historical memorials and public buildings. These include a cathedral which dates from 1601, several museums, much curious old timber architecture, an equestrian statue of Joan, and the house in which she was lodged. Population (1946 census), 64,755.

Orpheus (*ôr'fē-ŭs*). "The father of song," as he was called, was a legendary poet and musician of Greece. Presented with a lyre by the god Apollo and instructed by the Muses, Orpheus by his divine music not only

enchanted men and beasts, but even caused the trees to follow him. On his travels with the Argonauts, his music stopped rocks from crushing the ship.

'ORPHEUS AND EURYDICE'



This famous picture by Watts depicts a scene from the ancient myth. It hangs in the Tate Gallery in London.

When his wife Eurydice died, he followed her to the lower regions. His lyre charmed Hades into permitting her to follow him back to earth, provided he did not look at her on the way. But Orpheus' love made him look, and he saw Eurydice disappearing into the mists of the underworld. Grief-stricken, he scorned the women where he lived (Thrace), and they tore him to bits. The pieces were gathered by the Muses and buried near Mount Olympus, and there a nightingale sings over his grave.

OSAKA (*ō'sä-kä*), JAPAN. The largest industrial city of the Orient is Osaka. It is Japan's second city and the capital of Osaka Prefecture. Because of the smoke that overlies the city it has been compared to cities such as Manchester in England.

Osaka is in the south-central part of the island of Honshu, about 265 miles southwest of Tokyo. It lies at the head of Osaka Bay, toward the eastern end of the Inland Sea. Through it flow the Yodo and smaller rivers and canals. The city rests on the fertile Settsu Plain.

Outside of the modern business district, many of the streets are narrow and the buildings flimsy. A subway has been drilled below the central area. Osaka lies on one of Japan's great trunk rail lines. After Yokohama and Kobe, it is Japan's third port. Osaka's own harbor long remained shallow, and Kobe, 20 miles to the west, was Osaka's deep-water port. In 1929 the harbor was dredged so that it could float large ships. Osaka is the center of Japan's light industry and has both steel mills and shipbuilding yards. Its industries produce textiles, foodstuffs, machinery, leather, glassware, pottery, and chemicals.

The Osaka Imperial University and several technical schools furnish higher education. Osaka is famous for its ancient puppet theater and other stages. It has Buddhist and Shinto temples and some Christian missions.

An imperial palace was built on the site about A.D. 300. Osaka was Japan's military capital from 1583 to 1598. The city's commercial importance dates from this period. In the 17th century Osaka was called the "banker of Japan." In the 19th and 20th centuries the city's increasing foreign and domestic trade was built on this banking foundation. In 1945, during the second World War, Osaka became a major target for American bombs. About one third of the city was destroyed and many of its people killed. Population (1950 census), 1,956,136.

OSCEOLA (*ŏs-ē-ō'lä*) (1804?–1838). The leader of the Seminole Indians in their second war against the United States was Osceola. Osceola hated the white men because they wanted to move the Seminoles from Florida to new lands west of the Mississippi. His hatred grew when white men seized his part-Negro wife and enslaved her. Defying the agreement to move made by some of his chiefs, Osceola led his people in daring raids against the United States Army. He was captured only when the whites violated a flag of truce.

Osceola's name is more properly spelled *As-se-he-ho-lar*, which means "Black Drink." He was also known as Powell, the name of the man who may have been his white stepfather. Osceola's early history is not surely known. He was born about 1804 along the Tallapoosa River, in Georgia. When he was four his family moved to Florida. As a boy he may have fought against Gen. Andrew Jackson in the first Seminole war. As a grown brave he was tall and spare, with regular teeth, a straight nose, and flashing eyes. Indian and army authorities at Fort King sometimes hired him to restrain plundering Indians and to capture army deserters. He grew in importance among the Seminoles, but they did not make him a chief.

A GREAT INDIAN LEADER



Osceola opposed the white man's effort to move the Seminoles from Florida to Indian Territory. The Federal government had to send 8,000 soldiers against him.

In 1832 some Seminole chiefs signed a treaty that called for them to move to Indian Territory in present-day Oklahoma. Osceola and other young Seminoles opposed the move. In 1835 the Indian agent, Wiley Thompson, called a council at Fort Gibson. Some of the chiefs agreed to move. Osceola rose and plunged his dagger through the new treaty. He said, "This is the only treaty I will make with the whites!" He was imprisoned. But he pretended to change his mind in favor of the move and was released.

In December, the Indians slew a command of about 100 men under Maj. F. L. Dade. At about the same time Osceola killed Thompson, the Indian agent, and an army officer at Fort King. One of the chiefs who had signed the

treaty to move was tried and executed. Osceola threw away the money white men had given the chief for his slaves and cattle.

Osceola knew that the Indians were no match for the white soldiers in open battle. So he led the Seminoles deep into the great Okefenokee Swamp. There he hid the women and children. From the swamp he led the Seminole braves in fierce raids on the white soldiers and settlers. The American public criticized the conduct of the war, and one general after another was put in command. Finally Gen. T. J. Jesup was given 8,000 men to end the war.

Some of the Seminole chiefs had given many braves as hostages for the move to Indian Territory. In June 1837, Osceola, with 200 warriors, liberated them and other Indians held by the army. In October, with about 80 braves and some women, Osceola came under a flag of truce to confer with a subordinate of Jesup. Jesup ordered him seized.

Osceola was imprisoned first at St. Augustine and later in Fort Moultrie, at Charleston, S. C. Jesup's violation of a flag of truce was severely condemned by the American people. But Osceola died, on Jan. 30, 1838, before the criticism could bring his release. He was buried with full military honors.

Osiris (*ō-sī'rĭs*). The most popular of the gods in Egyptian mythology was Osiris, son of Seb (the earth) and Nut (the sky). He was esteemed as a wise and just king and later became the god of the sun, of health, and of agriculture. But his wicked brother Set (night) induced him to enter a chest, closed it, and cast it into the Nile. Isis, the wife of Osiris, discovered her husband's body, but Set got it again and cut it to pieces. These Isis gathered and buried, and Osiris became ruler of the dead. His son Horus avenged his murder by conquering Set.

On earth Osiris took the form of the sacred bull Apis. From the combined name Osiris-Apis came the form "Serapis," and later Serapis was thought of as a separate god. Osiris is usually represented wrapped in mummy cloths and wearing a high crown (*see* Isis).

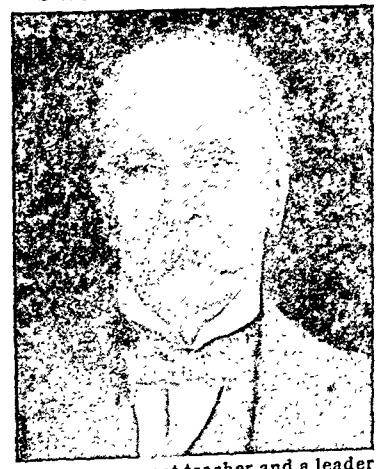
Osler, Sir William (1849–1919). One of the best known physicians of modern times was Sir William Osler. This vigorous Canadian won fame as a teacher, clinician, and consultant in his own country and in the United States and England as well. He stimulated his students to make research into the causes of disease, and his talks and writings did much to bring about modern public-health practises. He also helped establish the teaching methods practised today in American medical schools.

Osler was one of nine children of an Anglican minister. He was born in the parsonage at Bond Head, Ontario, on July 12, 1849. In 1857 the Oslers moved to Dundas, where "Willie" Osler received his early education. A small, wiry boy, Osler was good in his studies and athletics. He was mischievous too and once was caned for removing schoolroom furniture to the attic.

In 1866 he entered a boarding school near Toronto. He made friends with a schoolmaster and a physician. With them he made field trips and learned to mount specimens and use a microscope. The influence of these two men led him to study medicine. He entered the Toronto Medical School in 1868, but transferred to McGill University's medical school in Montreal in 1870 because of the better clinical facilities there. He began writing on medical subjects before his graduation in 1872.

Between 1872 and 1874 Osler studied in the great clinics of Great Britain, France, Germany, and Austria. In a London laboratory he was the first man to observe platelets (platelike bodies) in the blood. In 1874 he returned to McGill as a lecturer and the next year was made a professor. The Montreal General Hospital created the position of pathologist for him. In Montreal he continued his blood researches.

SIR WILLIAM OSLER



Osler was a great teacher and a leader in creating modern medical training.

In 1884 he became clinical professor at the University of Pennsylvania. In 1888 Johns Hopkins Hospital made him physician in chief, and later Johns Hopkins University appointed him professor of medicine.

Osler had long dreamed of teaching medicine in a school with ample laboratories and a well-paid, full-time staff. He made the Johns Hopkins medical courses models for other schools. In 1891 he published his still widely read 'Principles and Practice of Medicine'. In 1892 he married the widow of a doctor friend, and they had two children. With Thomas McCrae he edited a seven-volume work, 'Modern Medicine', published 1907–10.

In 1905 Osler accepted the Regius Professorship of Medicine at Oxford University. He also became a curator of the famous Bodleian Library. Throughout his life he wrote and lectured. He accumulated a large library and spent much time and effort in improving library facilities wherever he was. In 1911, at the coronation of King George V, he was made a baronet. Ill and grief stricken at the loss of his son in the first World War, he died in London on Dec. 29, 1919.

Oslo (*ŏs'lō*), Norway. The capital and largest city of Norway is Oslo. It is also the country's chief commercial center and seaport. Oslo is built at the mouth of the Aker River in southeast Norway. The Aker empties into the Oslofjord, which opens, some 80 miles southward, upon the Skagerrak. The name Oslo means "a meadow at the mouth of a river."

On all land sides of the city rise pine-forested hills. One of these hills is Holmenkollen. Here is Norway's famous ski jump and ski museum. On a promontory adjoining the city is the old fortress of Akershus, built about 1300. Several islands rise

above the water of the busy harbor. The principal street is Karl Johans Gate. At its western end, with a good view of the fjord, lies the Norwegian royal palace, and along it are built business houses, banks, and the university, established in 1811. Near the university are the historical and art museums. Among the great buildings are the National Theater, government offices and courts, and the parliament, built in 1866. On a peninsula near the city is the Folk Museum, which has several Viking ships and the famous polar ship *Fram* (*see* Polar Exploration).

Icebreakers keep the fjord free of ice during winter. Oslo's chief exports are fish and lumber. The harbor has grain elevators, shipbuilding yards, a floating dock, and a dry dock. Oslo is Norway's rail center. The chief manufactures are linens, woolens, wood pulp, machinery, brick and tile, flour, soap, hardware, glass, chemicals, and beer and liquors.

Oslo was founded in 1048 on the east side of the Aker's mouth by King Harald III. It soon became the seat of a bishop. In the 14th century it became the capital. Early buildings were mostly of wood and several times the city was badly damaged by fires and invasions. In 1624 a fire wiped out the town.

King Christian IV of Denmark, who then also ruled Norway, commanded a new town to be built on the Aker's other bank. It was named Christiania for the king. Over the centuries Christiania spread to include the old site, and in 1878 the old site officially became a part of the city. The name was changed to Oslo in 1925.

Oslo's slums have been torn down and modern, garden-type apartment houses built. The city provides several child-welfare agencies, including summer camps. During the second World War, Norway was invaded by the Germans and Oslo was the headquarters for the occupation forces. The city suffered little damage. Population (1950 census), 434,047 (includes 1948 extension of city limits).

OSTRICHES GUARD THEIR YOUNG



The drab female and the gorgeously plumed male guard the nest as the young birds break from their shells. Already the little ones are as large as barnyard hens. Full-grown ostriches run great distances at a speed of about 30 miles an hour.

OSSIAN, or OISÍN. The Irish legendary bard Ossian supposedly lived in the third century A.D. He is credited with telling in verse and prose of the battles, adventures, and tragedies of his father, Finn MacCool. In 1760 James Macpherson, a Scottish schoolmaster, published what he claimed were translations of Ossian's work. He followed this with more supposed translations. The works were enthusiastically received and their merit praised by Goethe and others. Dr. Johnson, however, claimed that they were forgeries. Macpherson was challenged to show his original manuscripts, but never did. After his death an investigating committee reported that Macpherson had liberally edited traditional Gaelic poems and inserted passages of his own. Although largely forgery, Macpherson's work is conceded to have literary merit.

OSTEOP'ATHY. A system of health and healing called osteopathy was founded in the late 19th century. It is based on the belief that the body is a machine that will manufacture remedies for disease if it is in correct mechanical adjustment. The therapy may be manipulation of the patient's body and surgery. The osteopath insists on proper diet, proper exercise and rest, pure air and water, and a wholesome mental and physical environment.

Osteopathy was founded by the physician Andrew Taylor Still (1828–1917). He organized the American School of Osteopathy at Kirksville, Mo., in 1892. There are now six osteopathic colleges. Two years of college must be completed before entering the four-year osteopathic course. There are about 11,000 osteopathic physicians in the United States.

OSTRICH. The largest of living birds is the ostrich. It is an awkward-looking creature of the African and Arabian deserts. The feathers that grow in its wings and tail are its only beauty. A full-grown ostrich is seven, and sometimes eight, feet tall. It weighs from 150 to more than 300 pounds. The male is larger than the female. The ostrich's undeveloped wings are useless for flying, but on its long, strong, thick legs it can speed across the desert faster than the swift Arabian horse. At full stride an ostrich's single leap covers 25 feet.

The ancients had good reasons for calling the ostrich the "camel-bird," for it resembles the camel in a number of ways. It has a long curved neck and a very small head, which it carries erect, a humped back, two padded toes

on each foot, and an ungainly walk. Like the camel it eats the coarsest desert plants. The ostrich, however, swallows stones and other hard objects which help to grind up the mass of roughage.

The feathers covering the body of the male bird are a rich black; its wings and tail have pure white feathers. These are highly prized as plumes. The tail feathers are considered second in quality. The female's gray feathers are not so much in demand. The strong leg of the ostrich and its sharp-clawed foot are its defense. It can kick sideways or forward so powerfully that men and animals have been killed by a single blow. The popular belief that the ostrich thinks it can hide by burying its head in sand is a myth. To camouflage its presence the ostrich elevates its tail and lowers its beak to the ground; from even a short distance the ostrich then looks like a bush.

During the breeding season ostriches are seen in groups of one male and four or five females. At other times the birds seem to enjoy the society of antelopes and other animals. To impress his harem, the male ostrich utters a deep muffled roar. When he roars his neck swells to twice its normal size but his beak remains closed. The females of the group lay their eggs, 40 or 50, in a common nest formed in the sand. The male sits on the eggs during the night, and the females take turns through the day. The eggs hatch in 42 days. The brood rarely exceeds 20 in number, for many of the eggs are broken. Often the male will kick out a few eggs if there are too many for his comfort in the nest. An ostrich egg weighs three pounds or more and is equal in amount and food value to two or three dozen hen's eggs.

Ostriches have been domesticated since the 1860's. Ostrich farming is a lucrative industry. The plumes vary in value according to fashion. Ostrich skins are used to make shoes, dressing cases, furniture coverings, and for other leather purposes. About 85 per cent of the world's supply of plumes comes from the ostrich farms of South Africa. North Africa, Australia, and America supply the other 15 per cent.

In the United States ostriches are raised successfully in California, Arizona, and elsewhere. The best results are obtained by hatching the eggs in incubators. The newly hatched bird is the size of a full-grown hen and in six months is near the size of its parents. Feathers are clipped when the birds are only six months old and may be clipped thereafter about every six months. Each wing gives about 30 feathers and the tail 60. The birds live to be 25 years old.

The closest relatives of the ostrich are the rhea of South America, distinguished by its three-toed foot, and the emu, the cassowary, and the kiwi of Australasia. In these birds the breastbone is not keeled, or ridged, as it is in all other birds, and so no attachment is provided for muscles strong enough for flight. The ostrich belongs to the family *Struthionidae*. Of the four living species, *Struthio camelus* of North Africa and Arabia is best known.

'OTHELLO'. One of the great Shakespearean tragedies is 'Othello'. Its tragic hero, Othello, is a dark-skinned Moor. Although he is a great military leader of the city-state of Venice, he is not fully accepted in the social life of the city. Nevertheless, he has married young and innocent Desdemona, the daughter of one of Venice's great families. The villain of the story is Iago, probably the most cunning and certainly the most evil character drawn by Shakespeare.

Iago believes that Othello has injured him, and the action of the play revolves around his schemes to revenge himself. Iago knows that all the joy of Othello's life rests on his love for Desdemona. So Iago plots to make Othello believe Desdemona unfaithful. With apparent reluctance, but with great skill, he hints to Othello that Desdemona really loves the commander's handsome young lieutenant. Cunningly he contrives to bring about situations that seem to prove Desdemona's betrayal of her husband's love.

Harassed by suspicion and the anguish of wronged love, Othello goes temporarily insane. In his madness he strangles Desdemona in her bed. Then he learns that he was tragically mistaken—that he has been tricked by Iago. Seized with a terrible remorse, he fatally stabs himself. Iago is seized and forced to bear the punishment that awaits him—"The time, the place, the torture."

Many actors have become famous for their interpretation of the rôle of Iago. His crafty speeches are often quoted. One, as he hints to Othello that Desdemona's good name is endangered, is:

> Good name, in man and woman, dear my lord,
> Is the immediate jewel of their souls;
> Who steals my purse, steals trash; 'tis something, nothing:
> 'Twas mine, 'tis his, and has been slave to thousands;
> But he that filches from me my good name
> Robs me of that, which not enriches him,
> And makes me poor indeed.

OTIS, JAMES (1725–1783). During the troubled days before the Revolutionary War, James Otis fought for the rights of the colonists. His pamphlets protested British violation of those rights, and they were read widely in both America and England. He helped to bring the colonies to their first united action in the Stamp Act Congress of 1765.

James Otis was the eldest of the 13 children of Col. James Otis, a Massachusetts lawyer, politician, and judge. James was born at West Barnstable on Feb. 5, 1725. He attended Harvard University and was graduated in 1743. He then read law and was admitted to the bar in 1748.

In 1750 Otis moved to Boston, and in the spring of 1755 he married Ruth Cunningham, the daughter of a wealthy Boston merchant. They had three children, a son and two daughters. A portrait painted when Otis was 30 years old shows a strong, round, pleasant face and shrewd, narrow-lidded eyes. He had a quick intelligence and he argued his law cases persuasively.

Otis was the king's advocate general at Boston, and as such was ordered to obtain court writs that

would permit search for smuggled goods in any house without a search warrant. Rather than do this, Otis resigned and became the leader of the opposing counsel. At the court hearing in 1761 he defended the Americans' rights to the protection of English law against unlawful search in a dramatic four-hour speech. It was this speech that John Adams called a "flame of fire," and later described as the first gun of the Revolution.

From this time on, Otis was increasingly active in fighting for the colonists' rights. Two months after the speech Otis was elected to the Massachusetts legislature. He served there until 1769 and with Samuel Adams shared the political leadership of Massachusetts. He was an active member of the Sons of Liberty and other patriotic organizations.

In the legislature Otis made the motion that resulted in the representatives of the American colonies meeting in New York City for the Stamp Act Congress of 1765. The Congress appointed him to the committee that framed an address of protest to the British House of Commons.

In 1769 the king's custom commissioners in Boston described Otis as a "malignant incendiary" and accused him of treason. Otis retorted hotly in an article that appeared in the *Boston Gazette* of Sept. 4, 1769. The next evening he entered the Boston Coffee House where some of the commissioners were assembled. A brawl resulted, and Otis was struck on the head. Otis became insane, and some historians claim his disability was caused by this blow.

Otis regained sanity for a time, and in 1771 was again elected to the legislature. But he soon exhibited new signs of derangement, and a court declared him insane. Afterwards he was cared for by relatives and friends. He was killed by a bolt of lightning on May 23, 1783.

OTTAWA, ONTARIO. The capital of Canada is Ottawa. It lies on the south bank of the Ottawa River, near the eastern tip of Ontario. On the opposite shore is the city of Hull, in the Province of Quebec.

The Ottawa River at this point plunges about 50 feet over the Chaudière Falls. The Rideau River skirts the city to the south and east, joining the Ottawa over the mist-shrouded Rideau Falls. The Rideau Canal flows through the heart of the city. Below Hull, from the Quebec bank, the Ottawa receives the Gatineau River. About 22 miles of driveways and 830 acres of parks take advantage of the city's beautiful location.

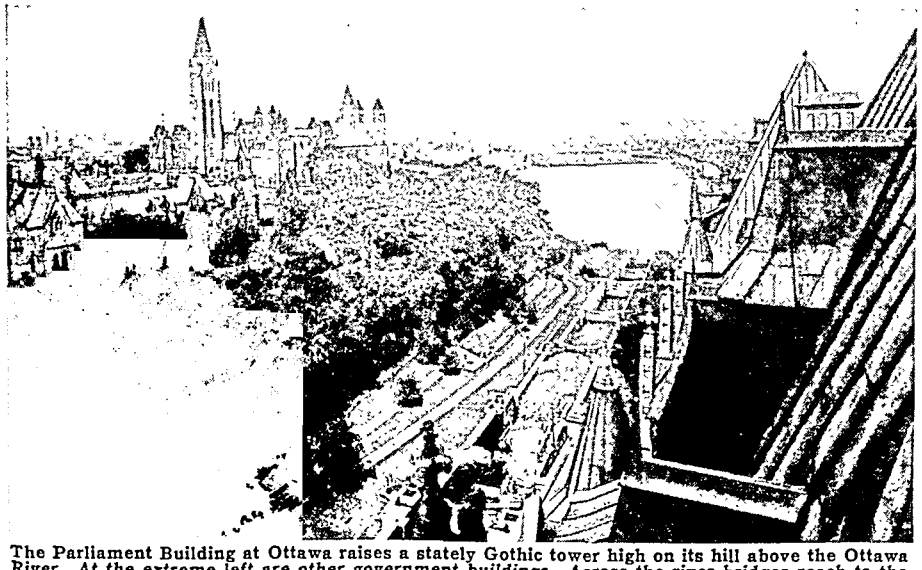
Parliament Hill, crowned by government buildings in the Gothic style, rises steeply 160 feet above the Ottawa River. Ottawa has two cathedrals (one Church of England and the other Roman Catholic), the University of Ottawa (Roman Catholic), the National Museum, the National Gallery of Art, and the Dominion Observatory.

A National Capital Plan provides for future development of Ottawa and the surrounding communities. It anticipates a maximum population of half a million within a five-mile radius of Parliament Hill. The largest project within the master plan involves relocation of the railways and industries in a belt around the south and east edges of Ottawa and the north and west edges of Hull. There will be new government buildings along the river banks, National Zoölogical and Botanical gardens, a National Sports Center, a new National Art Gallery, and a National Library.

Within ten miles of Ottawa, a potential of one million hydro-electric horse power is available. Below the city, canals have been built in the Ottawa River to form a highway through the St. Lawrence to the Atlantic. The Rideau Canal, running southward, connects Ottawa with the Great Lakes at Kingston; and the valleys of the Ottawa and Gatineau lead to rich timber and mining regions to the west and to the north.

The lumber industry surpasses all others. Millions of feet of logs are floated down the Ottawa and Gatineau to the city's paper and pulp mills and wood products plants. Meat-packing plants, railway car shops, clothing factories, and cement works are also important. Many beautiful resorts in the surrounding countryside bring in tourists, both winter and summer.

THE SEAT OF CANADA'S GOVERNMENT IN OTTAWA



The Parliament Building at Ottawa raises a stately Gothic tower high on its hill above the Ottawa River. At the extreme left are other government buildings. Across the river bridges reach to the city of Hull. In the foreground are the great locks of the Rideau Canal. The locks lower ships to the level of the Ottawa River.

Philemon Wright, a New Englander who scttled on the north side of the river near the end of the 18th century, may be regarded as the founder of Ottawa. In 1826, Colonel By was sent from England to construct the Rideau Canal, and his engineers and workmen established the settlement of Bytown which formed the nucleus of the present city. In 1854 the town was incorporated and its name changed to Ottawa. Four years later Queen Victoria, unable to adjust the rival claims of Montreal, Quebec, and Toronto, selected Ottawa for the Canadian capital. Fire destroyed the main parliament building in 1916, but it was soon rebuilt. Population (1951 census), 202,045.

Federal District of Ottawa. In 1945 an area of 900 square miles was set aside as a federal district. Physical planning of the area is thus facilitated. The district remains under the political control of Ontario and Quebec.

FISH DINNER—QUICK SERVICE



An instant ago this otter lay on shore in wait for his dinner. A quick dive, a short pursuit and the fish is overtaken. It hasn't a chance, for the otter is faster in the water than the fish itself. Ashore, the otter enjoys a leisurely meal. Though he prefers fish, his diet may include crayfish, duck, young beavers, muskrats, or even frogs.



Otter. If the land animals should hold a swimming and diving contest the otter would be a likely candidate for championship honors. It is so much at home in the water, diving, rising, and turning with lightning-like quickness, that it can beat the fish at their own game. In fact its food is chiefly fish.

This aquatic carnivorous animal is related to the weasel, but is much larger. It has been so much hunted for its fur, especially in America, that it is becoming very rare; but it may still be found occasionally in various parts of the country from Alaska to Florida. Approximately 25 pounds in weight, it has an elongated body, about two and one-half feet long (exclusive of the tail), with short limbs and webbed hind feet. It is seal-like in form and is covered with a thick coat of fine dark brown fur, brighter below than above. The common otter of Europe is similar in form to the American otter but shorter.

Otters are fond of sliding down slopes into the water; and in winter they slide on the snow and enjoy coasting as well as a schoolboy. Among themselves otters are playful and affectionate, and they have been tamed, making intelligent and useful pets. Some have been trained to answer their master's whistle. In certain parts of India and China tame otters are used to catch fish for their masters or to drive them into nets. They take excellent care of their offspring, which are usually from two to five in number. The dens generally have the entrance under the water. Sometimes a nest is found under a hollow tree, again in a cave.

The sea otter, which is much larger and heavier, and brings forth but a single pup, is a related form that belongs to another genus. It is one of the most valuable of fur-bearing animals, and a single skin will bring over a thousand dollars. It was once abundant in the Pacific from California northward, but now is very rare, except around the Aleutian Islands where it is protected by law. It is about four feet long, and has fine dense lustrous fur almost black, sprinkled with long white-tipped hairs.

Scientific name of common otter of the Old World, *Lutra lutra vulgaris;* of North American otter, *Lutra canadensis;* of sea otter, *Enhydra lutris.*

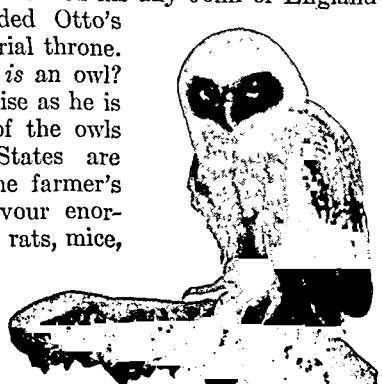
Otto, Emperors of the Holy Roman Empire. Four emperors of the Holy Roman Empire bear the name of Otto or Otho. Otto I of the Saxon line ruled Germany from 936 to 973, and in 962 reëstablished the empire of Charlemagne under the name of "the Holy Roman Empire of the German Nation." He is usually known as "the Great." He is described as having a powerful figure, a red face, a long wavy beard, and eyes that moved incessantly "as if they were watching their prey." His deeds show him to have been a man of energy, courage, and military skill. He strengthened the royal control over the unruly German dukes, conquered Italy in 952, and three years later won a great victory over the invading Hungarians (Magyars) at the battle of Lechfeld in Bavaria.

His son Otto II was emperor from 973 to 983. On the whole he maintained the gains of Otto I, but died in Rome, at the age of 28, while on an expedition to that rebellious country. He is buried in St. Peter's.

His son Otto III (983–1002) thus became German king when he was only three years old, and was crowned emperor by the pope at Rome when he was 16 (996). His mother was a learned Byzantine princess, and his tutor Gerbert (later Pope Sylvester II) was the greatest scholar of that day, especially in mathematics. The young emperor himself, however, was dreamy and impractical. With his death at Rome, at the age of 22, without children, the direct Saxon line came to an end.

Otto IV (1198–1214) was a member of the house of Welf (Guelf), was educated at the court of Richard I of England, and was put forth as a rival candidate against the Hohenstaufen Philip of Swabia. Although he gained the throne with the aid of Pope Innocent III, his course as emperor was so hostile to the church that the pope excommunicated him in favor of Frederick II. The battle of Bouvines (1214) in northern France, in which his ally John of England was defeated, ended Otto's hopes of the imperial throne.

Owl. How wise *is* an owl? Probably not so wise as he is useful, for most of the owls of the United States are counted among the farmer's friends. They devour enormous quantities of rats, mice, insects, and other enemies of crops. It is estimated that in some regions an owl is worth $20 a year to a farmer.



Anybody can see why this one is called the Spectacled Owl.

THE BARRED OWL



The Barred Owl is one of the commonest sorts found in the United States. This is a young bird, before the feathers show many stripes.

Most owls are blinded by daylight, so that the hunt at night. The short-eared owl, one of the few exceptions, hunts on cloudy days. Owls that live in the polar regions, such as the snowy owl, have learned to hunt by day because the summer days are so long. The eyes cannot move in the eye socket, so the owl must turn its head from side to side to see. Surrounding the eyes is a feathered disk that gives the effect of a mask over the face. The neck is short and thick and the legs are set so far back on the body that the bird sits in an upright position. The plumage, which is generally gray or brown mottled with lighter shades, is very fluffy and gives an appearance of great size.

The owls' nests of various kinds are found in old buildings and in cavities of rocks and in trees; sometimes the birds repair the discarded nests of hawks or of squirrels. The eggs, invariably white, are from three to five in number.

Owls are found in all parts of the world. Because of a difference in structure the barn owls are placed in a separate family (*Tytonidae*). All other owls belong to the family *Strigidae.* The barn owl of the United States has buff and grayish upper parts mottled with black and white. Its heart-shaped facial disk and under parts vary from white to deep buff with the buff usually dotted with tiny black spots. It is especially valuable to man because it preys chiefly on rats and mice.

THE BARN OWL



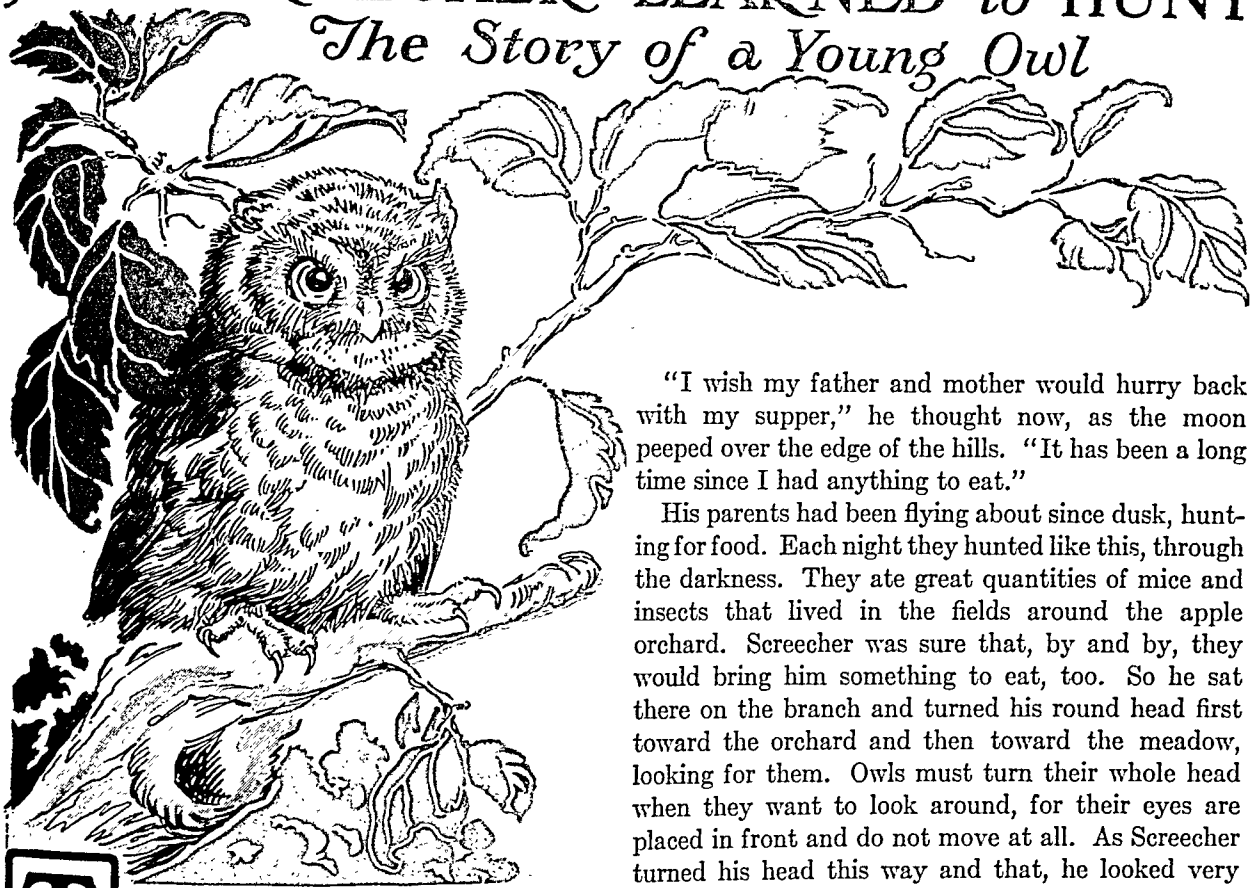
This is the kind which makes its home in barns and thus has acquired its name.

The long-eared owl, a woodland bird of temperate North America, has two conspicuous ear-like tufts of feathers on its head. It is 15 inches long, and has dark brown upper parts mottled with white.

The barred owl is the "whoo? whoo?" questioner so often connected with ghost stories. He lives along swamps and in dense forests, where the deep booming of his call might well discomfit even a strong-hearted night traveler. His plumage is handsomely striped and barred and his eyes stare as from behind immense tortoise-shell-rimmed spectacles. Some-

How SCREECHER LEARNED to HUNT

The Story of a Young Owl



THE OLD apple orchard was very peaceful and quiet in the twilight. Most of the birds had gone to rest, and only an occasional sleepy note broke the evening stillness. On a branch of an apple tree at the edge of the orchard, Screecher, a downy young owl, sat blinking his great eyes. He was waiting for his parents to return with food for him.

Most of the day Screecher had been asleep in the family nest—a bare hole inside the apple tree. Like most owls, he slept in the daytime. Now that the sun had gone down, he was wide awake and very hungry for his supper.

He was lonely, too, because the three other little owls who had been hatched there in the family nest had already flown away. They had wanted Screecher to fly away with them, but he was not yet ready to go. It was pleasant to stay here in the old apple tree, sleeping through the day, and waking at evening to eat the beetles and bugs, or perhaps the fine fat field mouse, that his parents brought him. And it was pleasant to sit here in the darkness and listen to the cries of other owls, as they flew softly about in search of food. So, although the other little owls had made fun of him, young Screecher had stayed on in the old apple tree.

"I wish my father and mother would hurry back with my supper," he thought now, as the moon peeped over the edge of the hills. "It has been a long time since I had anything to eat."

His parents had been flying about since dusk, hunting for food. Each night they hunted like this, through the darkness. They ate great quantities of mice and insects that lived in the fields around the apple orchard. Screecher was sure that, by and by, they would bring him something to eat, too. So he sat there on the branch and turned his round head first toward the orchard and then toward the meadow, looking for them. Owls must turn their whole head when they want to look around, for their eyes are placed in front and do not move at all. As Screecher turned his head this way and that, he looked very grave and solemn, and a little angry, too, for he was getting hungrier and hungrier.

Presently he saw his mother flying toward him, her wings moving slowly and silently. For a moment he watched her in admiration. He loved to watch his parents fly. The soft feathers on their wings were tipped with a downy fringe, so that they could move through the air without making any sound at all. And because they flew so silently, they could hear the little creatures moving about through the grass, and could pounce upon them so noiselessly that it made young Screecher very proud of them. He, too, would fly like this some day, he knew; and he hoped he would have fine reddish brown feathers, like his father's. Many screech owls are gray, and Screecher thought his father was much more splendid than the gray owls.

"What did you bring me for supper?" he asked eagerly, when his mother alighted on the branch beside him.

"Nothing," she told him. "Your father and I think it is high time you were learning to catch your own food."

"But I am so hungry, mother," Screecher complained in surprise. "Won't you please catch me something to eat?"



The father owl had pounced upon a field mouse

"No," his mother answered. "Not one mouse, not one bird, not even one beetle, will I ever catch for you again. You must look out for yourself from now on, Screecher. You are plenty old enough to do this."

"Oh, dear!" Screecher cried, in his high quavering voice. "Oh, dear! What shall I do?"

Just then his father alighted on the apple tree, and the young owl stopped his crying at once. "Father," he begged, "*you* will catch a mouse for me, won't you? You won't let me go hungry, I know."

"There is no need for you to go hungry, Screecher," the father owl said pleasantly. "There is plenty of food to be found on the ground. You have only to fly a little way to get all you want."

"Oh, father!" Again Screecher raised his voice. "I don't want to get my own supper! I want you to bring it to me. Pl—e—ase!"

The father owl did not wait for Screecher to say anything more, but flew softly to the ground. "Now," thought the young owl, "he will bring me my supper. I knew he would if I coaxed."

The father owl had pounced upon a field mouse and, holding it in his claws, he flew back to the branch beside Screecher. But to the young owl's dismay, his father at once began to eat the mouse.

"Oh, father!" Screecher cried sharply, "you are eating my mouse!"

"No," his father replied, "this is my mouse. I caught it, you know. If you want food, you must catch it for yourself now. You have good sharp ears, and if you will only listen, you will hear any number of small creatures moving about on the ground. They will make a fine meal for you."

Screecher was disappointed, but he obeyed his father and, sure enough, he heard something stirring in the grass. Without waiting a moment, he flew down and caught a fine fat beetle!

"There! That's right," said his father, when Screecher was once more beside him on the branch. "A little later, you can practise catching mice. You will soon be able to do it as well as I do."

With this, the father owl gave his long quavering cry and flew away. The mother owl, with only a glance to see that Screecher was all right, flew after him.

"Well," thought Screecher, as he watched them go, "it is plain to be seen that if I want any more supper, I must catch it for myself." And then hearing another beetle he flew down and seized it.

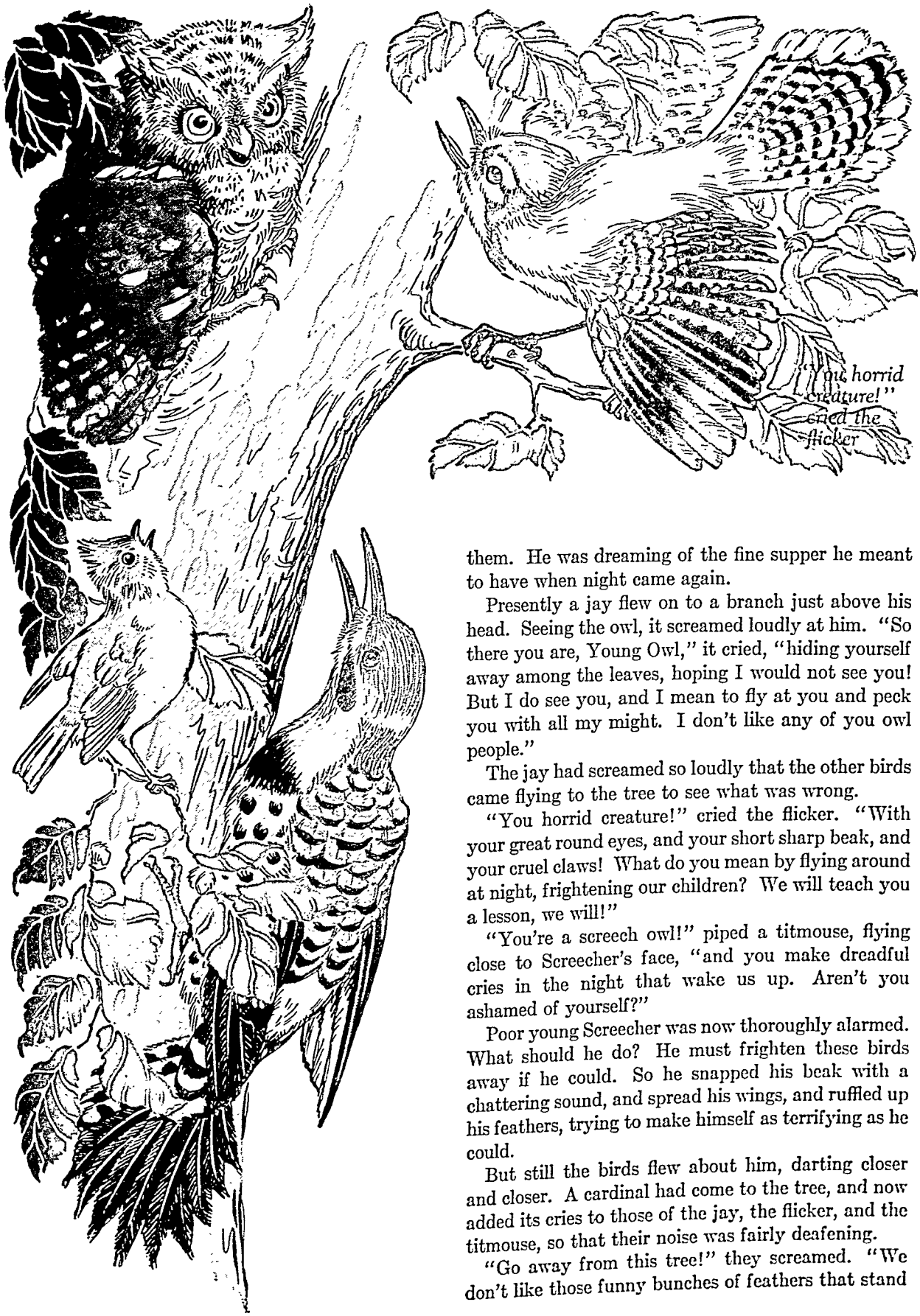
All night long he flew about, finding all kinds of dainties in the grass—earthworms, moths, spiders, and even an occasional snail. He ate so many of them that at last he could not eat another thing.

The east was now growing pale with the coming dawn. The young owl decided to go back to his nest and sleep until another night should come. But, as he looked about, he found that his own apple tree was nowhere to be seen. He had flown so far from home in his search for food that he could not find his way back! He was lost!

At first this frightened him, for the day was coming fast, and he did not see very well in the daylight. But after a moment, he wisely decided to seek shelter in the thick branches of a near-by tree. "I will wait here until darkness comes again," he thought, "and then I can find my way home."

When he was settled on a leafy branch, he turned his round head from side to side to look about and be sure that he was well hidden. Then he contentedly shut his eyes and went to sleep.

Higher and higher rose the sun. The birds sang gayly all around him, but Screecher did not hear



"You horrid creature!" cried the flicker

them. He was dreaming of the fine supper he meant to have when night came again.

Presently a jay flew on to a branch just above his head. Seeing the owl, it screamed loudly at him. "So there you are, Young Owl," it cried, "hiding yourself away among the leaves, hoping I would not see you! But I do see you, and I mean to fly at you and peck you with all my might. I don't like any of you owl people."

The jay had screamed so loudly that the other birds came flying to the tree to see what was wrong.

"You horrid creature!" cried the flicker. "With your great round eyes, and your short sharp beak, and your cruel claws! What do you mean by flying around at night, frightening our children? We will teach you a lesson, we will!"

"You're a screech owl!" piped a titmouse, flying close to Screecher's face, "and you make dreadful cries in the night that wake us up. Aren't you ashamed of yourself?"

Poor young Screecher was now thoroughly alarmed. What should he do? He must frighten these birds away if he could. So he snapped his beak with a chattering sound, and spread his wings, and ruffled up his feathers, trying to make himself as terrifying as he could.

But still the birds flew about him, darting closer and closer. A cardinal had come to the tree, and now added its cries to those of the jay, the flicker, and the titmouse, so that their noise was fairly deafening.

"Go away from this tree!" they screamed. "We don't like those funny bunches of feathers that stand

up on your head like horns. Why should you have horns, anyhow? We don't!"

"They are not horns!" Screecher answered angrily. "They are tufts of feathers that grow above my ears. And good sharp ears I have, too. I can hear better than any of you."

Screecher knew now that he could stay here no longer. So, without waiting another moment, he spread his wings and flew away. The birds screamed at him as he went, but the young owl landed safely in a tree a long way off and quickly hid himself in the heavy foliage.

For a long time he sat there, not daring to go to sleep. To add to his discomfort, he began to feel hungry once more. Ever since he had been hatched from a round white egg, Screecher had always had food in the daytime, for his parents had left worms and insects in the nest where he could find them when he woke up from time to time. Now there was no food for him unless he flew to the ground and caught it for himself. But screech owls do not hunt in the daytime, and he knew he must wait until the darkness came. So he closed his eyes and went to sleep again, and this time he slept in peace.

The twilight had come again when he woke, refreshed by his sleep. The other birds had gone to rest, and as he sat blinking his eyes and looking about he felt very contented and happy. It was fine, he thought, that he was now old enough to catch his own food, instead of having to wait for his parents to bring it to him. And as for the birds who had scolded him, he would take good care after this to hide himself where they could not find him. One of these days, when his feathers had grown a little longer, he would be able to fly about through the night without fear. He would be able to frighten his enemies and drive them away by flying at them, flapping his wings, and even pecking them with his strong curved beak, as he had often seen his parents do. Yes, it was a good thing to be a young owl who could go where he pleased and catch his own food.

Tightening his eight strong toes around the branch on which he sat, he looked down at the ground. Down there, somewhere in the grass, was all the food that he could eat; but, although he was hungry, he was in no hurry to begin his hunt. He had the whole long night before him.

An old screech owl flew silently past his tree. He could see its body outlined against the twilight—its round head covered with soft brown feathers, out of which its two great eyes gleamed. He could see the soft brown feathers that covered its body thickly, and he watched with admiration as its wings rose and fell without a sound.

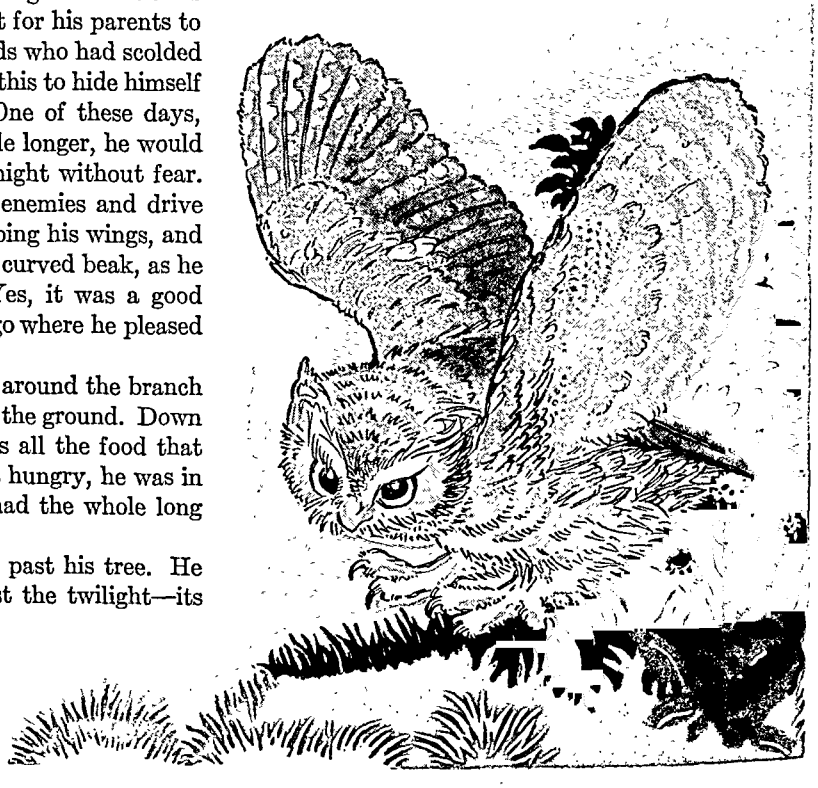
Another screech owl, farther off, sent up its long shivering cry. Perhaps it was his mother, Screecher thought, or his father; he did not know. And it did not matter much, for now the dark had come and owls were flying everywhere. He, too, would fly presently.

Again he looked down at the ground, listening intently. All of a sudden he swooped. Straight down he went, softly and surely. And in a moment, his claws had closed around a field mouse.

He had done it! He had caught a mouse! He was able now to look after himself, as his parents had said he must. How proud they would be!

Flying up to a low branch of the tree, he raised his voice in a long thin cry that rose and fell with a trembling sound. From not far away there came an answering cry, and Screecher knew that it was his father's voice.

"I will go right now," he thought, "and tell him about the mouse I caught!" And, spreading his wings, he flew happily away into the night.



All of a sudden he swooped. Straight down he went, softly and surely

THE SCREECH OWL



This is a small bird, only nine to ten inches long.

times he eats small birds, but generally frogs, lizards, and mice are his diet. The burrowing owl, found on the western plains, inhabits holes dug usually by other animals. Their chief food is grasshoppers, but they eat lizards also.

The screech owl is responsible for the long, wailing, shivering night cry heard so generally throughout the middle and eastern parts of the United States. It is of this bird that the child Hiawatha speaks:

"What is that?" he cried in terror;
"What is that," he said, "Nokomis?"
And the good Nokomis answered:
"That is but the owl and owlet,
Talking in their native language,
Talking, scolding at each other."

Screech owls, represented by many species and varieties, range over almost all of North America. They nest in trees, often in a deserted woodpecker's hole. In addition to mice they eat some small birds, but make up for this by destroying many cutworms and caterpillars.

The great horned owl is called the "tiger of the air," for he is powerful and bloodthirsty, and the sweep of his great wings through the night air is as noiseless as the tread of the padded paws of the king of the jungle. He cannot be counted among the farmer's friends, for he is fond of domestic fowls and will repeatedly raid the farmyard. A single member of this group has been known to carry off 59 young guinea fowl in one autumn. Rabbits are also a favorite food, and these are the only birds known to dine upon the skunk.

The snowy owl, with its white plumage, breeds in the cold regions of North America, but in the winter it travels south through the states, sometimes as far as Texas. Having grown up in the land of the midnight sun, it sees quite well in daylight and often secures its food while other owls are sleeping. On the wing it is so swift that it will overtake a grouse in flight.

The elf owl, no larger than an English sparrow, is found nesting in the giant cactus of southern Texas and Mexico. Its food is grasshoppers and beetles. It is seldom seen in daytime. (For illustrations in colors of barn owl and screech owl, *see* Birds.)

Primitive peoples have many superstitions about owls, most of which seem to arise from their peculiar cries. In the hoot of most owls the predominant sound is *oo*, *hoo*, or *ow*, giving it an unearthly quality.

THE SNOWY OWL



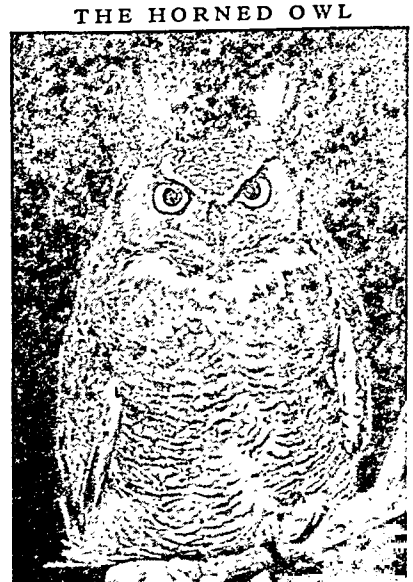
An inhabitant of northern regions, where his coloring blends with the snowy surroundings.

Some of the smaller owls have, nevertheless, a low and melodious note. In many parts of Europe the hoot of an owl is regarded as a sign of death. On the other hand, its solemn, thoughtful air has caused its reputation for wisdom since ancient times, when it was the symbol of Athena, the Greek goddess of wisdom.

Every detail of the owl's body illustrates successful *adaptation* to night life. Even the hoot startles animals into betraying their location by rustling in leaves or grass. Any such rustle is detected instantly by the owl's sensitive ears. The ears have an external flap, which most birds lack; and in many species a funnel-like arrangement of feathers serves as an ear trumpet to aid hearing. The owl's eyeballs are elastic and long from front to back; so they can be focused sharply for near or distant vision. The pupil can be closed nearly tight by day and opened wide to make the most of night light.

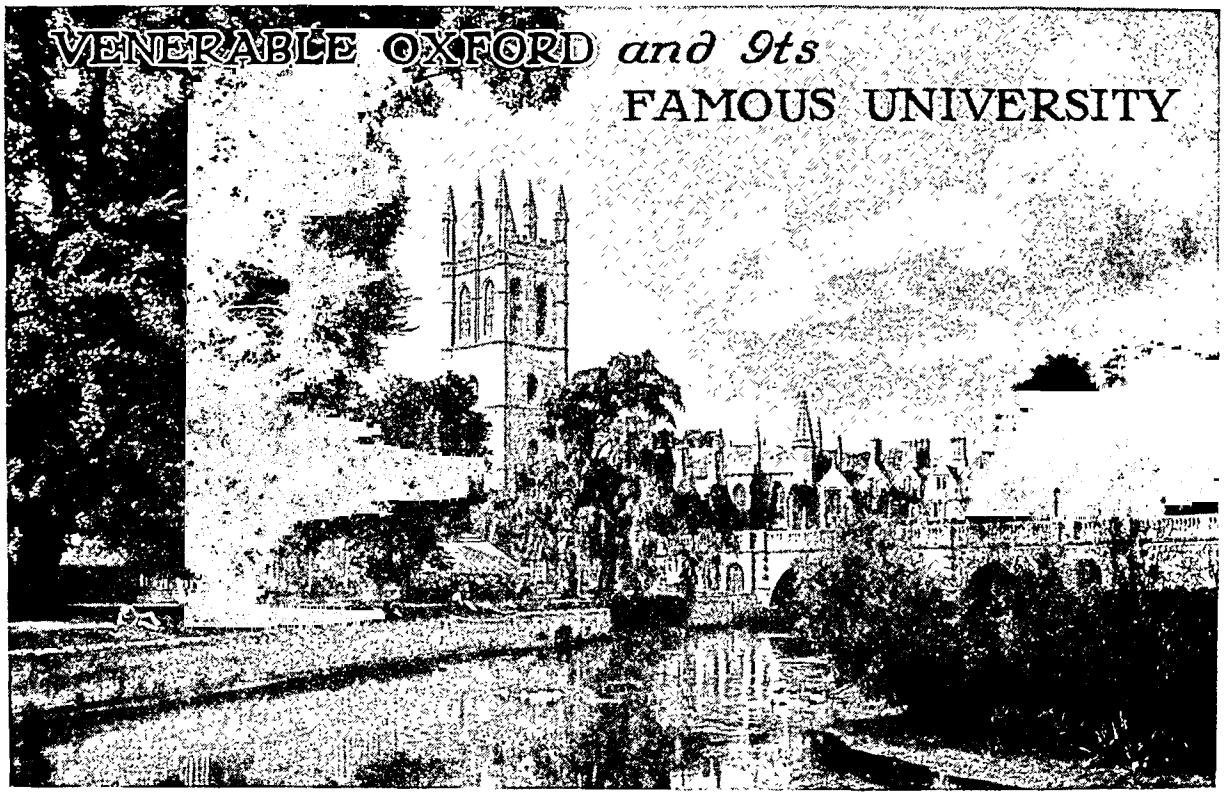
Soft feathers make the owl's flight noiseless in approaching a victim (*see* Feathers). The outer claws can be turned in any direction; when the owl turns them backward in perching, it gets greatly increased strength of grip.

THE HORNED OWL



Swift, silent, and savage in its attack, the great horned owl is the one most feared by rabbits and poultry.

Owls form the order *Strigiformes;* they are close relatives of the nightjars. Scientific name of barn owl *Tyto alba pratincola;* screech owl, *Otus asio;* great horned owl, *Bubo virginianus virginianus;* snowy owl, *Nyctea nyctea;* barred owl. *Strix varia;* long-eared owl. *Asio wilsonianus.*



OXFORD, ENGLAND. Cupped in the purple hollow of softly swelling hills, held in the embrace of the stripling Thames and its lovely tributary the Cherwell, this famous English city is wrapped in a haze of romance and beauty. For nearly a thousand years its gray spires and towers have looked down upon an unbroken procession of great men and great events. To its venerable colleges have come England's youthful statesmen, poets, and philosophers to be nurtured in the traditions of beauty and sweetness.

Within the crumbling fronts of the Oxford colleges lived and labored the philosopher Locke and the historian Gibbon, the essayists Steele and Addison, the encyclopedic Dr. Samuel Johnson, and the reformer John Wesley. Shelley, De Quincey, and Ruskin, Newman, and Matthew Arnold have paced their moldering cloisters. Shakespeare must have slept in the quaint inns of the city as he journeyed from Stratford to London. Here Sir Robert Peel and Gladstone laid the foundations for their eminence as statesmen by taking "double firsts"—the rarest and most coveted scholastic honor that can be won at the university. Here, in the 19th century alone, ten prime ministers of Great Britain spent their student days. To mention all the illustrious men whose names are linked with Oxford would be to call the long and glorious roll of English history and English letters.

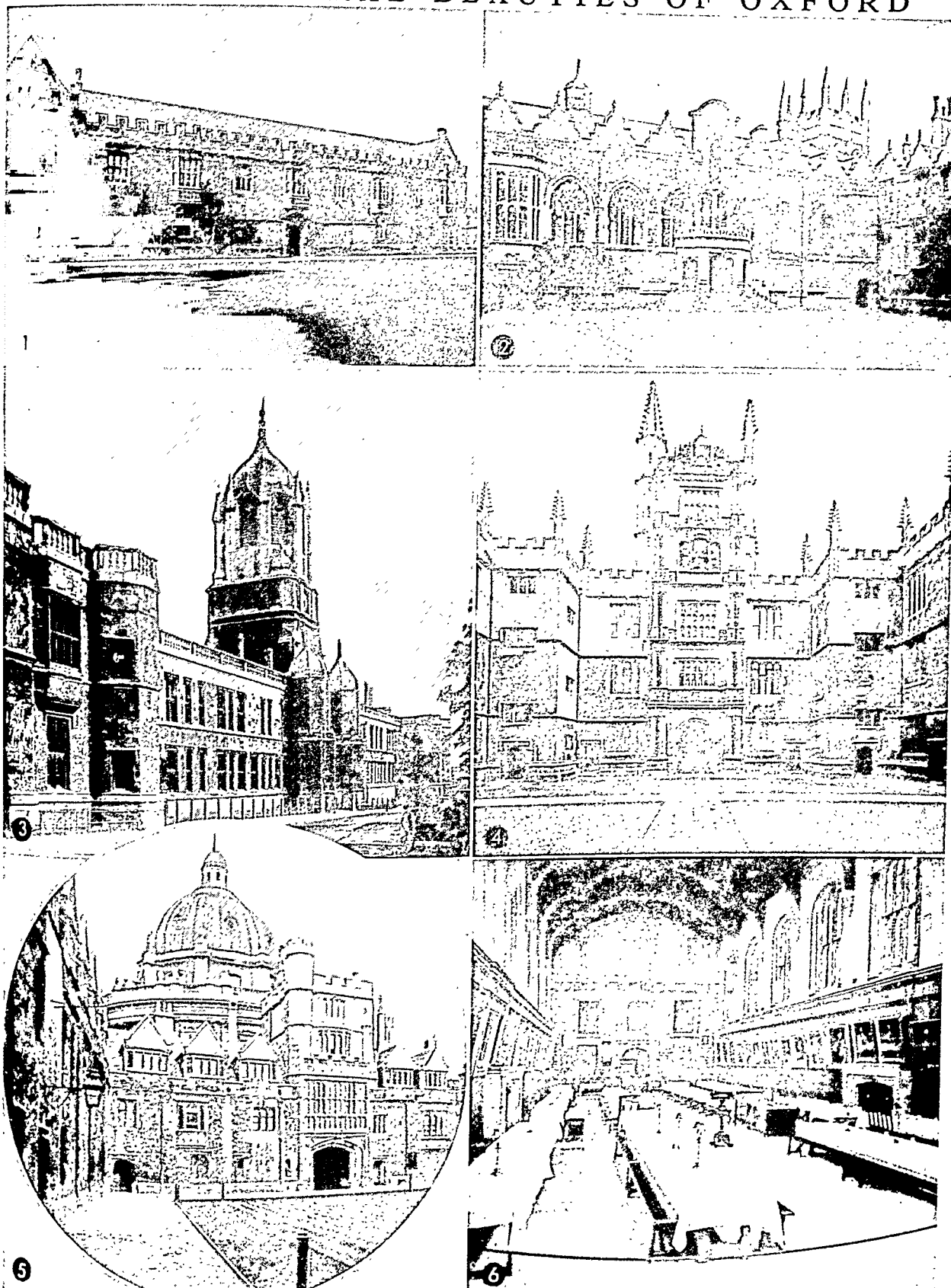
The origin of Oxford is lost in the mists of antiquity. It first rises from the haze in 737, when St. Frideswide founded her nunnery on the site of Christ Church College. A thriving market town soon sprang up, which was burned by the Danes in 1009. The oldest known architectural remains are the tower of St. Martin's Church (1034) and the castle tower (1071). In this tower Empress Matilda, daughter of Henry I, was besieged by Stephen of Blois in 1135, and escaped by fleeing over the frozen snow-covered river, clad in white to prevent detection.

Legend attributes the founding of the University of Oxford to Alfred the Great, but the first discoverable traces of organized teaching in the city are about 200 years later, in the 12th century. Hither soon swarmed students from all over the world, and by the end of the century it had an academic population of 3,000. There were as yet no university buildings, no laboratories, no endowments. "Masters" gave instruction —all in Latin—to such students as chose to attend their lectures, and their entire income came from fees collected from their pupils. They were turbulent fellows, these medieval students, and enlivened their scholastic routine by frequent bloody affrays with the townsmen, so that the "town and gown" riots of Oxford became proverbial.

The friars began building monastic establishments in the 13th century. They flocked to Oxford in such numbers that they soon aspired to the control of the university. This caused ceaseless strife between the religious orders and the ancient colleges, which was only ended when Henry VIII dissolved the orders.

During the civil wars of the 17th century, Oxford became the seat of Charles I and the Royalist court,

ARCHITECTURAL BEAUTIES OF OXFORD



Two great churchmen, Cardinal Wolsey in the 16th century and Archbishop Laud in the 17th, left an indelible impress on the University. Wolsey founded Christ Church College, whose dining hall (6) contains a portrait gallery of famous alumni. The Tom Gate and Tower (3) form the main entrance to this college. Laud was an alumnus and fellow of St. John's (1), and became a chancellor of the University in 1629, just one century after the fall of Wolsey. The other buildings shown are Oriel College (2), the Bodleian Library (4), and Brasenose College (5)

IN THE FAMOUS OLD BODLEIAN LIBRARY



This is one of the corners of the University which maintains a truly 17th century aspect. The library was founded in 1602, and is particularly rich in early editions of Greek and Latin classics and in books printed by Caxton and other early English printers. In one of the alcoves are a number of books, bound in heavy oak boards and fastened by iron chains to the bookcases, just as they have been fastened for hundreds of years.

while Parliament held forth at Westminster. Several important battles of the period were fought near by.

In organization, methods, and spirit, Oxford University is strikingly different from American universities. It is made up of 21 separate colleges, each with its own history, its own income, its own regulations, and its own characteristic organization. The colleges are federated into the university much as the states are federated into the United States.

The colleges with the dates of their founding are:

University	1249	Brasenose	1509
Merton	1264	Corpus Christi	1516
Balliol	1266	Christ Church	1525
Exeter	1314 and 1566	Trinity	1555
Oriel	1326	St. John's	1555
Queen's	1340	Jesus	1571
New	1379	Wadham	1613
Lincoln	1427	Pembroke	1624
All Souls'	1437	Worcester	1714
St. Mary Magdalen (pronounced *Maudlin*)	1474	Keble	1868
		Hertford	1874

The university is an independent self-governing corporation, with its own police and its own courts. Its main functions are holding examinations, conferring degrees, and caring for the discipline of students when outside the walls of their own colleges.

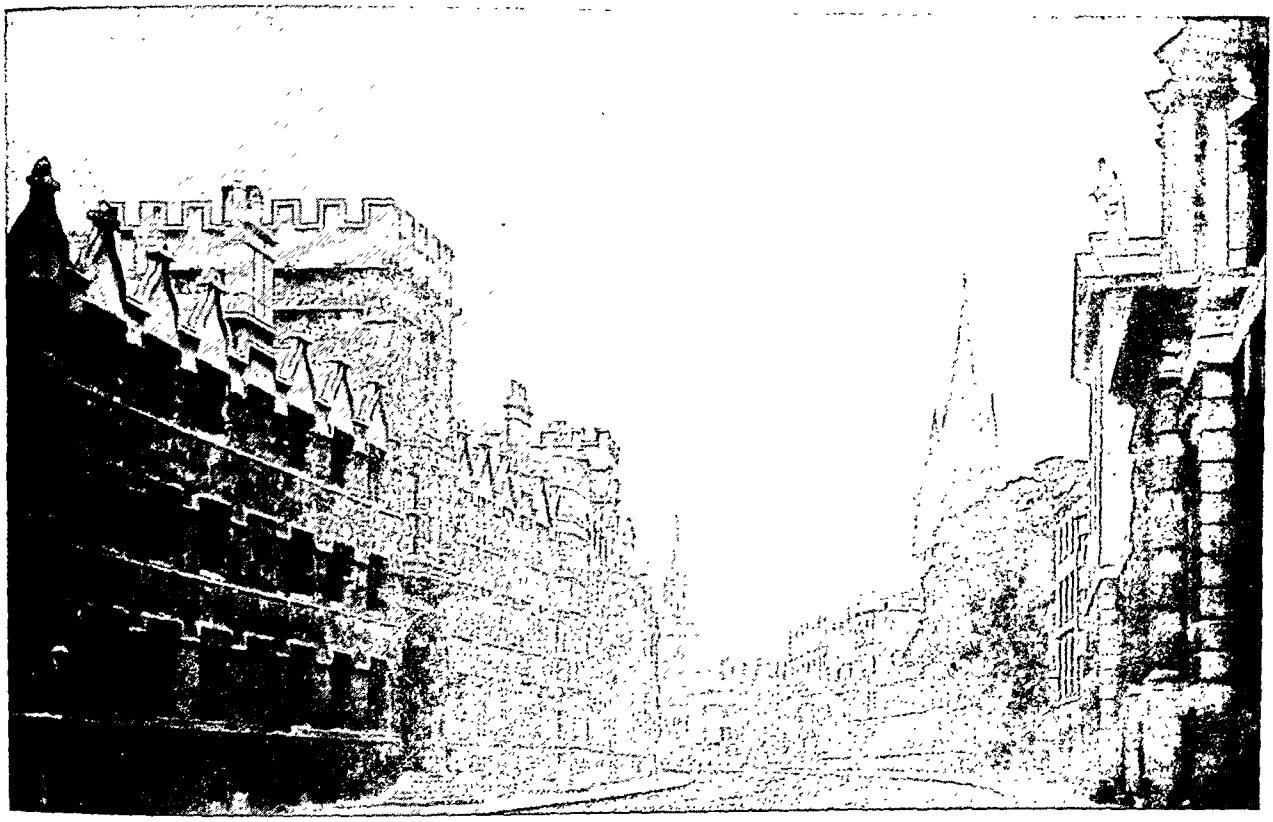
Within the massive semi-monastic buildings of the colleges—each grouped around its own quadrangle of velvety lawn—the students live a life adorned by many curious survivals from medieval days. On all academic occasions, such as lectures, conferences with tutors, chapel, dinners "in hall," the undergraduate must wear his quaint short gown and his "mortarboard" cap. He must be within the walls of his own college before midnight, and he is required to pay a small fine if he comes in after the great college gates are closed at nine o'clock.

Members of the university are in residence only half the year. Most of the real reading for the degree is done during the six months of vacation. Lectures, essay writing, conferences with tutors, and reading take up from four to six hours of the average man's daily schedule during the term time. The rest of the day is given over to social life and athletics, which play a far more important part at Oxford and Cambridge than elsewhere. Every man is expected to spend his afternoons in some form of outdoor sport. There are teams enough in all the colleges so that everyone has a chance to play the game he likes best.

Rowing is by far the most popular of all sports at Oxford, and a large proportion of the students spend their afternoons on the river the academic year 'round. Besides the university "eight," each college has its own crew. The "bumping" races between the college eights every spring and the Oxford-Cambridge races in the summer have for generations been among the most famous sporting events of the world.

The college tutor is the most important cog in the Oxford educational machine. He comes into personal contact with the student to a degree unknown in the universities of other countries. Every undergraduate is under the direction of one or more of these tutors, who lays out the course of study, advises in the selection of lectures, and holds weekly or semi-weekly conferences with the student, for which the latter is usually required to prepare an essay.

ONE OF THE MOST FAMOUS STREETS IN THE WORLD



This is the street affectionately called by Oxford students "The High." Fronting both sides of its half-mile curve are noble buildings, many, like University College on the left, strongly suggestive of medieval castles. First on the right is Queen's, surmounted by a statue of Queen Caroline, the wife of George II. Farther down on the right is another castle-like structure, *All Soul's College*, and back of it rises the spire of St. Mary's, the University church.

Through the Rhodes scholarships Americans and Canadians, and other British colonials have been brought to this famous old university in far greater numbers than formerly (*see* Rhodes, Cecil John). Every year sees a new group of students come from foreign colleges to enjoy the unique privileges which Oxford offers—its finely tempered combination of ancient buildings and modern learning, its traditions of sound scholarship and keen sportsmanship, the close association with fellow students and teachers resulting from the college and tutorial systems, and its unsurpassed beauties of scenery and architecture.

Oxygen. What do you suppose is the most abundant substance in the world and the most widely distributed? It is oxygen, which exists as an uncombined gas in the air we breathe, and in combination with other chemical elements forms water, sand, limestone and other rocks, iron rust, sugar, cloth, paper, and so on. About half the weight of limestone, bricks, and such materials is oxygen, and eighty-nine hundredths of water is the same substance. As free oxygen it makes up one-fifth by bulk of the whole atmosphere.

In its free state oxygen is a gas without color, odor, or taste. Oxygen, however, is very active chemically, and readily enters into combination with nearly all other elements. Sometimes heat promotes this chemical union, and sometimes moisture, as in the rusting of a knife blade. When wood burns it is a case of the oxygen of the air uniting rapidly with the carbon and hydrogen of the wood; for chemically "fire" is only the *rapid* oxidation of a substance. When oxygen thus unites in combustion with carbon, carbon dioxide, which also is an invisible gas, is formed. When oxygen unites in combustion with hydrogen, water is formed. It is easy to prove this, for if a piece of cold chinaware is passed swiftly over a flame of any sort (such as a gas flame) moisture will be condensed on it. This is an experiment which any child can easily try for himself. From the smokestack of a locomotive comes what you may call black smoke and white smoke. The black smoke is composed of fine particles of carbon which have not burned up; the white is a cloud of condensed water vapor, which soon evaporates into the air. The ashes of wood and coal are the parts which would not burn, or which when burned did not become gases.

Oxygen is necessary for all animal life. Nitrogen is necessary, too, but oxygen has a different use. It may be hard to believe that our bodies are being "burned" all the time, but this is a fact. The body tissues contain carbon and hydrogen compounds just as in wood and coal, and these are constantly being "oxidized," or combined with the oxygen in the air we breathe. In the case of our bodies the "burning"

is a *slow* combustion, but it also produces heat, which keeps us warm. If you work or exercise violently you become warmer, owing to the faster oxidation. The same chemical products are formed as in the case of the oxidation of the wood—namely, carbon dioxide and water. Breathe on a cold mirror and you will see the water vapor condensed on it.

Fish need the free oxygen that is dissolved in water. That is why water for goldfish must be changed and why air is kept bubbling through aquarium tanks where it is inconvenient to change the water. There is not as much free oxygen in water as in air, but the hemoglobin in the fish's blood extracts the oxygen just as it does in warm-blooded animals. In sunlight green plants take carbon dioxide from the air, use up the carbon, and return the oxygen (*see* Carbon Dioxide and Monoxide).

Oxygen was discovered in 1774 by Priestley, an English chemist. Soon after this, Lavoisier, a French chemist, proved that oxygen is abundant in air. He also found that it combines with metals to form rusts, or oxides, and showed the part it plays in combustion.

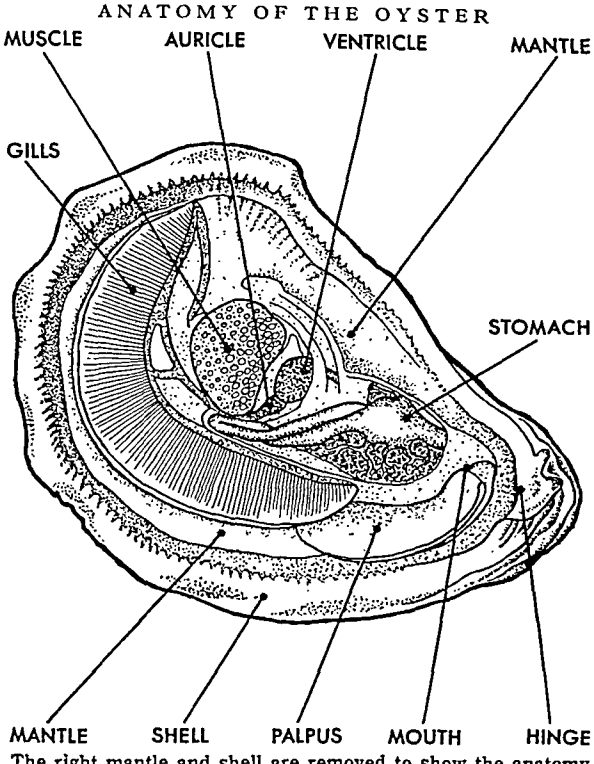
The Oxygen Atom

Atoms of free oxygen usually combine by twos to form molecules (O_2). Three atoms may unite to form the allotrope *ozone* (O_3). This can be made by passing electric sparks through ordinary oxygen. In nature it is formed at high altitudes in part at least by lightning. It has a peculiar smell, is a powerful enough oxidizing agent to attack rubber and cork, and is used as a germicide.

The oxygen atom exists in three forms, or *isotopes*. Their atomic weights are 16, 17, and 18 (*see* Chemistry). In 10,000 parts of ordinary oxygen there would be only two isotopes of weight 17 or 18. Thus the usual practice is to give the atom weight of oxygen as 16 which disregards the heavier isotopes, or *heavy oxygens*.

The SHELLFISH *That Is* CULTIVATED *Like a* GARDEN CROP

OYSTER. One of the most nourishing of all sea foods and a valuable source of income to fishermen is the oyster. Unlike most products of fisheries, oysters are "planted" and harvested as scientifically as any truck garden crop. Practically all the oysters in the United States today are taken from underwater "farms" by growers who lease the beds from the state government to plant and cultivate the crop. Oysters are shellfish. They are bivalves (two shells) of the mollusk group (*see* Mollusks). They live in quiet bays and river mouths where the salt water of the ocean is diluted with fresh water from flowing streams. They are found along the shores of all temperate and tropical oceans, but the supply in the North Atlantic exceeds that of all other waters combined.



The right mantle and shell are removed to show the anatomy of the oyster. The muscle is near the middle, with the heart just in front of it. The auricle and ventricle are heart chambers.

In Europe, oysters are found from Norway to the eastern Mediterranean and the Black Sea. In the United States, oyster beds are scattered from Cape Cod to the Gulf coast of Texas and from Puget Sound to San Francisco on the Pacific coast. Chesapeake Bay is the greatest center of oyster production. Long Island Sound, the Louisiana coast, Puget Sound, and Willapa Harbor on the Washington coast are other highly productive regions.

Different Kinds of Oysters

There are about a hundred species of oysters. They vary widely in size, shape, and habits. The three most valuable edible kinds are the North American oyster of the Atlantic coast (*Crassostrea virginica*); the common European oyster (*Ostrea edulis*); and the rock oyster (*Ostrea cucullata*), found along the coasts of Japan, Australia, and the many islands of the South Pacific. The native oyster of the Pacific coast of North America is a small, thin-shelled, purplish-colored species (*Ostrea lurida*) marketed as the Olympia oyster. The meat is about the size of a man's thumbnail. A large, oblong-shaped oyster (*Crassostrea gigas*) found in Japan has been transplanted to the Pacific coast, where it is known as the Pacific oyster. It has been known to grow to a foot or more in length but it averages much less.

The inedible oyster from which fine pearls are sometimes obtained belongs to a different genus, *Meleagrina*, native to warm parts of the Pacific Ocean. The edible oyster never produces a valuable pearl. The material with which it lines the inside of the shell is of a chalky consistency, lacking the mother-of-pearl which gives the true pearl its beauty.

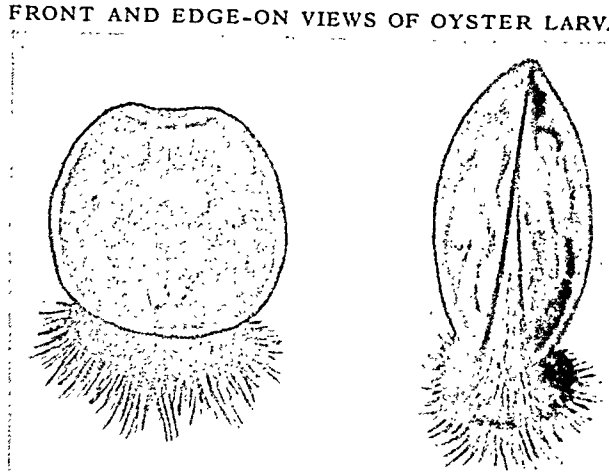
In the United States, oysters of various sizes and with variously shaped shells are popularly named for the regions where the type was originally cultivated. For example, blue points, cotuits, saddle rocks, chincoteagues, and lynnhavens are named for places on the shores of Long Island, Massachusetts, and Virginia. They all belong to the same species, *Crassostrea virginica.*

Life History of the Oyster

The oyster lays its eggs only in warm waters with a temperature of 66° to 70° F. In New England spawning begins early in July. On the Gulf coast it may continue from March to November. The female produces millions of eggs at one time and almost half a billion eggs in a single season. So many and so constant are the dangers to which oysters are subject that only one egg in four million can be expected to reach maturity.

Eggs and sperms are discharged directly into the water and unite only by chance. The fertilized egg produces a free-swimming larva in 5 to 10 hours. Under a microscope it looks like a watermelon seed with a crown of rapidly moving hairs at the small end. The larva swims by means of these hairs (*cilia*), which extend outside the two tiny shells. Eggs, sperms, and larvae become a part of that great mass of living, microscopic material known as *plankton,* which forms the basic food supply of other dwellers of the sea. Few eggs or larvae survive. Those that do drift with the tides and ocean currents and may travel far from the quiet harbors where they were spawned.

FRONT AND EDGE-ON VIEWS OF OYSTER LARVA

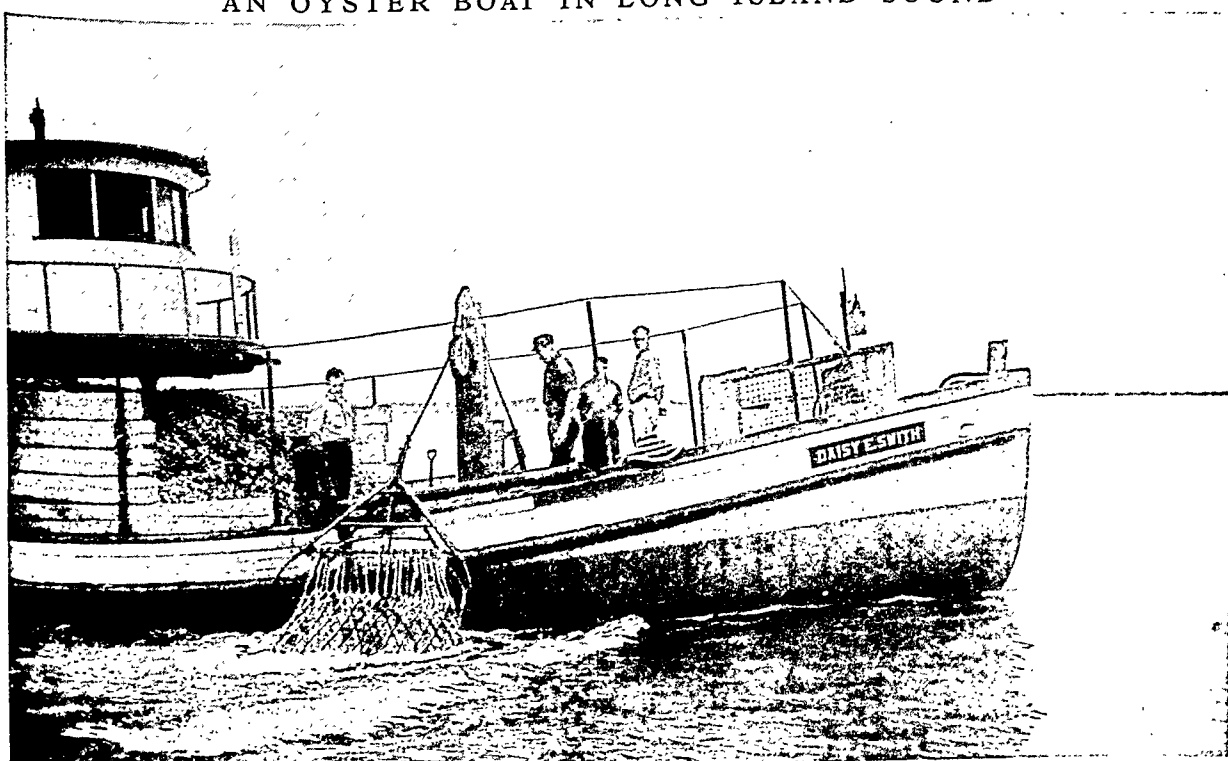


The oyster larva develops a tiny shell within 12 hours of hatching. It swims by means of a tuft of rapidly moving hairs.

At the end of two weeks the larva is about one seventy-fifth of an inch in diameter. Now it is ready to give up its free but hazardous life and attach itself to some firm object—a rock, another shell, perhaps the pilings of a wharf. The process is known as "setting" or "striking."

Only a few larvae make a successful "strike." For best growth they require a hard, clean surface. If they fall into a muddy bottom or a growth of algae and weeds they may smother. On the Gulf coast many oysters settle in mud. They develop a long, narrow irregular shape and small, poorly shaped meat which

AN OYSTER BOAT IN LONG ISLAND SOUND

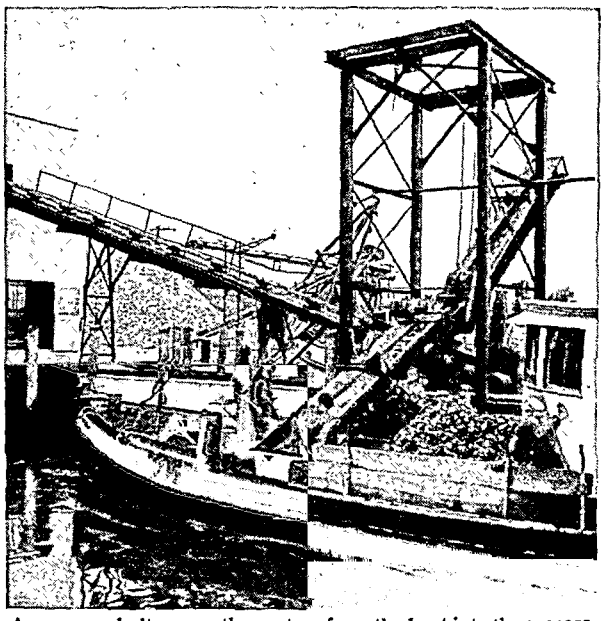


This boat is dredging up oysters from a bay in Long Island Sound. The dredge is a large openwork bag of cord and iron chain with sharp teeth on the lower edge. The dredge is drawn over the bottom. The oysters are caught by the teeth, dragged into the bag, and brought to the surface. Another type of boat draws them up by suction pump on the principle of the vacuum sweeper.

MOVING OYSTERS FROM THE SEA TO THE PROCESSING PLANT



The loaded basket is pulled over the side of the boat with a winch and dumped on the deck. It takes two men to handle each basket.



A conveyer belt moves the oysters from the boat into the processing plant. In the background may be seen a mound of empty shells.

make them unmarketable. They are known as "coons" because raccoons feed on them. Many of them grow on the roots of mangrove trees. When the tide recedes the roots are left high above water with the oysters clinging to them.

The larva attaches itself by means of a cement-like substance which it secretes. It is never again able to move of its own accord. The young oyster at this stage is called a "spat." It grows rapidly and in two weeks, at the age of about four weeks, its shell is a quarter of an inch long. Any oyster from a quarter inch to two inches in length is known as a "seed oyster."

In southern waters oysters reach market size in two or three years. About four years are required in the north, where they stop growing in the winter and go into an arrested condition similar to hibernation. They start feeding and growing again when the waters become warm. Their food is the one-celled plant life known as diatoms.

The Anatomy of the Oyster

The oyster shell is usually oval in shape, somewhat enlarged at one end, grayish white, and coarsely ridged. There are two halves, or valves, which open and close at the hinge. The half which attaches to the submerged object becomes hollowed out as it grows in order to accommodate the body of the growing oyster. The upper half is flattened or even pushed from above. The soft body of the oyster is attached to the shell by a stout muscle. It extends from one valve, or half of the shell, through the animal's body to the other valve and enables the oyster to close its shell tightly. A fold, called the mantle, grows from each side of the body, completely lines the shell, and secretes new shell. Large flaps form the gills. The gill plates are covered on the surface with very fine hairs. When the shell is open the hairs move rapidly, producing a current which flows over the gills and carries oxygen to the blood. The current also drives in food particles. They strain through the gills and into the mouth and the digestive tract. Two folds, called palpi, enclose the mouth. A large oyster may filter more than a barrel of water through its body in a day.

Enemies of the Oyster

Throughout its life the oyster is attacked by hordes of enemies. Many larvae are consumed by fishes such as the menhaden, which strain their food from the water. The attached oyster has a new set of shellfish enemies. One of the worst is the oyster drill, a kind of sea snail. It kills the oyster by drilling a small round hole into the shell, through which it thrusts its long feeding tube.

Equally destructive is the starfish. Sometimes starfish, moving over the bottom in great armies, as in Long Island Sound, destroy several hundred thousand bushels of marketable oysters in a season. The starfish wraps its arms about the oyster and liberates some of its own stomach juice which the oyster draws in with the water. The juice gradually paralyzes the oyster's muscle, and the shell is forced open. The starfish pushes its stomach out through its mouth, wraps it around the meat of the oyster, and quickly digests it.

Among other oyster enemies are fish armed with crushing teeth like the sting ray of California and the black drum of the Atlantic. Certain sponges also burrow into and riddle the shell.

Oyster fishermen attempt to destroy these enemies by various ingenious devices. Starfish are entangled in great mops—iron bars with five-foot strands of rope yarn. The mops, attached to chains, are dragged

over the oyster beds from a boat, then immersed in tanks of hot water on deck. Drills and starfish are pulled off the bottom by suction dredges, similar to big vacuum cleaners, which can bring up 15 bushels in ten minutes. Experiments are being made with chemicals which kill or injure starfish but do not affect other fish or shellfish.

Commercial Oyster Fishing

Oyster beds in the United States once seemed inexhaustible. They have declined very greatly in recent years, however, due to overfishing, wasteful methods of fishing, water pollution, and natural enemies. The catch declined from 101 million pounds in 1931 to about 76½ million pounds in 1950. Chesapeake Bay is the chief producing region, accounting for almost 40 per cent of the total. The Middle Atlantic region, chiefly Long Island Sound, and the Gulf coast of Louisiana rank second and third respectively.

Through the activity of the United States Fish and Wildlife Service, the states have passed laws regulating the fisheries. Today the industry is almost wholly dependent on systematic cultivation. Natural oyster beds account for less than one per cent of the total production.

The oyster grower leases beds from the state, choosing a site in shallow bays and coves. He clears the bottom of snags and debris. If the bottom is too muddy, it is prepared by strewing it with a layer of clean oyster shells, gravel, or other hard material to which the spat may attach themselves.

Unless an oyster spawning ground is near there will be no spat. In this case seed oysters are sown over the bottom, about 500 bushels to the acre. On the Pacific West coast oyster beds are commonly seeded by stock from Japan. The oysters may be transplanted several times to thin them out and provide the best feeding conditions.

In shallow waters the oysters are collected by means of tongs. In deeper waters a dredge is used. A new type of dredge operates on the principle of the vacuum sweeper. It sucks up not only the oyster but also its enemies, the drills and starfish, which are separated and saved for fertilizer. Some growers plant the seed oysters in wire baskets which are easily taken up for transplanting and collecting.

Oysters are shipped long distances in refrigerator cars or in ice, either alive in the shell, as bulk oyster meats, or canned. Biloxi, Miss., is the center for the production of canned oysters. Oyster shells are used for strewing over fresh beds, pulverized for chicken feed and fertilizer, or burned to make quicklime.

Food Value of Oysters

The belief that oysters are edible only in the "R-months" (September through April) dates from prerefrigeration days when shellfish could not safely be shipped during warm weather. Actually they are at their best in May. Fishing in most areas, however, is not permitted during the summer spawning season, and so they are scarce at that time.

Oysters are among the most nourishing of all foods. They contain copper, iron, and manganese, which are valuable in combating anemia; iodine, which regulates the thyroid gland and helps prevent goiter; and calcium and phosphorus, needed for bone growth. They contain most of the essential vitamins. The protein is especially high in nutritive value, and starch is present in the form of glycogen, which is readily digestible. No food product is subject to more rigid sanitary regulations by state health authorities.

Huge heaps of oyster shells found near prehistoric settlements along the coasts of Europe and America show that the oyster has always been a favorite food of humans. A simple type of cultivation, with the formation of artificial beds, flourished in China at a very remote period. In Italy oyster culture was practiced as far back as 100 B.C. In the important maritime countries of Europe artificial cultivation accounts

SHUCKING AND CLEANING IN THE PROCESSING PLANT



Removing oysters from the shell is called "shucking." With a strong knife the shucker cuts the muscle and scoops out the meat.



Oysters to be canned are put into a "bath" where they are cleaned, and air under high pressure dislodges bits of sand and shell.

for fully 90 per cent of the output. In France oysters are cultivated in oyster parks. The spat are collected on fagots of brush, on tiles, or on other types of collectors placed near spawning beds. The seed oysters are then removed to partially enclosed grounding ponds which admit the tides through sluices and flood gates. When fully grown the oysters are fattened in small ponds, or *claires*. The Japanese harvest oysters from thickets of bamboo sticks thrust into tidal flats.

IN THE PLAYGROUND OF THE MIDDLE WEST



The quiet charm of the Ozark countryside is felt in the scene pictured here, with its dirt road winding through hardwood and pine forests to the lonely hills beyond. The stake and rider fences are typical of a region where timber is abundant.

OZARK MOUNTAINS. The upland region of the Ozark Mountains rises like an island in the midst of the Middle Western plains. Until modern highways penetrated its beautiful forested hills and deep coves, it remained isolated—a bit of the American frontier left behind and almost forgotten in the march westward.

More properly known as the Ozark Plateau, the region covers about 40,000 square miles in southern Missouri, northwestern Arkansas, and northeastern Oklahoma. The plateau is a low dome thrust upward less than 2,000 feet above the surrounding plains. The top of the dome is in the St. François Mountains of southeastern Missouri. Here the limestone covering has been stripped by erosion, leaving the crystalline core of the continent exposed in such hills as Iron Mountain (1,077 feet high) and Pilot Knob (1,014 feet high).

Southward the plateau is a rolling plain, heavily forested and pocked with caves and sink holes where underground water has dissolved the limestone. The White River and its tributaries have carved deep gorges across the plateau. The Ozarks end abruptly in Arkansas before a higher plateau known as the Boston Mountains, whose bold escarpment rises a thousand feet above the White River valley. These wild and deeply dissected mountains are about 2,200 feet high, 200 miles long, and 35 miles wide. They descend on the south to the valley of the Arkansas River.

Along the ridges and deep in the "hollers" the farmers raise corn, cattle, and pigs. Most of the soil, however, is a flinty mantle of chert which gives a poor return for their labor. National forests cover many thousands of square miles. In the western part of the plateau there is more level surface, and the limestone covering remains to create rich soil. Here dairying, truck gardening, and fruit raising are commercially important. Zinc deposits around Joplin, iron in the St. François Mountains, lead, manganese, barite, and tripoli are among the many minerals.

Scenery is the greatest asset of the Ozarks. Modern highways have brought its beautiful hills and forests, its lakes and streams, within a day's drive of 10 million people. Dams across Ozark streams, built to give hydroelectric power and water to the cities of the plains, have proved perhaps equally valuable in providing new recreational facilities. The Lake of the Ozarks, created by Bagnell Dam across the Osage River, and Lake Taneycomo behind Forsyth Dam on the White River are Missouri's most popular resorts. Spavinaw Lake Dam and the Grand River Dam, both in Oklahoma, have created popular lake resorts. The mineral waters of Eureka Springs, Ark., have attracted health seekers since the middle of the 19th century. The word Ozark is a corruption of the French name for the region, *Aux Arcs*, which means "at the bows," so-called for the Bow, or Quapaw, Indians.

THE EASY REFERENCE FACT-INDEX

GUIDE TO ALL VOLUMES FOR SUBJECTS BEGINNING WITH

N-O

TO SAVE TIME

USE THIS INDEX 

EDITOR'S NOTE ON NEXT PAGE TELLS WHY

SPECIAL LISTS AND TABLES

National Flowers 446
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Numerous other lists and tables in the fields of geography, history, literature, science, mathematics, and other departments of knowledge will be found with their appropriate articles in the main text

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EDITOR'S NOTE

EVERY user of Compton's Pictured Encyclopedia should form the habit of *first* turning to the Fact-Index section at the end of each volume when in search of specific information. This index is a miniature work of reference in itself and will often give you directly the facts, dates, or definitions you seek. Even when you want full treatment of a subject, you will usually save time by finding in the index the exact page numbers for the desired material.

All page numbers are preceded by a letter of the alphabet, as A-23. The letter indicates the volume. If two or three page numbers are given for the topic you are seeking, the first indicates the more general and important treatment; the second and third point to additional information on other pages. Where necessary, subheadings follow the entry and tell you by guide words or phrases where the various aspects of the subject are treated.

The arrangement of subheadings is alphabetical, except in major historical entries. In these the chronological order is followed.

The pictures illustrating a specific subject are indicated by the word *picture* or *color picture* followed by a volume indicator and a page number. A picture reference is frequently intended to call attention to details in the text under the illustration as well as to the illustration itself. This picture-text, therefore, should always be carefully read. The pictures are usually on the same page as the text to which you are also referred; sometimes they are found in a different but related article which will add interest and information.

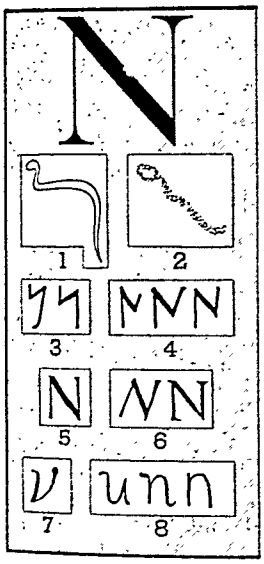
The pronunciations given are those preferred by the best and most recent authorities; alternative pronunciations are indicated where usage is divided.

In recent years hundreds of foreign geographical names have been changed, either officially or by custom. Both old and new names are given at the appropriate places in the alphabet.

Populations are those of the latest census or an official estimate when available if no census has been taken since World War II. Distances between points are map or air distances, not distances by railroad.

THE EASY REFERENCE FACT-INDEX

Reg. U. S. Pat. Off.



OUR LETTER N probably started in ancient Egypt as a picture of a snake (1). To the Egyptians the picture meant 'snake'; but soon after 2000 B.C., a Semitic people called the Seirites adopted it as an alphabetic sign for the sound of 'n'. They did so because their word *nahash* for 'snake' began with this sound.

For their sign the Seirites made a crude snake (2). The later Canaanite-Phoenician alphabet made the sign with angles (3). The Semitic names for the sign resembled the name *nun* in Hebrew.

When the Greeks learned to write from the Phoenicians, they changed the name of the sign to *nu*, and made all the strokes about the same length (4). Later they equalized the upright strokes (5). Meanwhile the Romans had worked out the same change in Latin (6). From Latin, the letter came without change into English.

The small handwritten 'n' always has been a quickly made, simplified imitation of the capital. In Greek it was a direct imitation with one stroke omitted (7); in medieval Latin and in English it is more like the capital, with curves substituted for angles (8). The printed small 'n' imitates the handwritten character.

NOTE.—For the story of how alphabetic writing began and developed, *see* the articles Alphabet; Writing.

NAACP. *See in Index* National Association for the Advancement of Colored People

Nabateans (*năb-ą-tē'ănz*), people of ancient Arabia; flourished from about 312 B.C. to A.D. 105
ruins of Petra, *picture* A-418

Nablus, Palestine. *See in Index* Shechem

Nabonas'sar, king of Babylonia 747–734 B.C.; probably vassal of Tiglath-Pileser III, who invaded Babylonia but permitted Nabonassar to remain in nominal independence.

Naboni'dus, last ruler of Chaldean Empire, and father of Belshazzar; succeeded to throne 556 B.C., but gave more time to building temples than to preparing for Persians, who took him prisoner in 538 B.C.

Nabopolas'sar, king of Babylonia 625–605 B.C., founder of the Chaldean Empire; aided by Medes, he captured Nineveh in 606 B.C.; father of Nebuchadnezzar.

Naboth (*nā'bŏth*), owner of a vineyard coveted by Ahab, and obtained by Jezebel through murderous fraud (I Kings xxi).

Nacelle (*ná-sĕl'*), in airplane A-97.
See also in Index Aviation, *table* of terms

Nacimiento, manger scene in Spanish Christmas celebration C-293, 295

Nacogdoches (*năk-ō-dō'chĕz*), Tex., town about 140 mi. n.e. of Houston; county seat and center of rich cotton and farm district; pop. 12,327; Stephen F. Austin State College; in 18th century was Spanish mission; captured by Americans 1812: *map* T-90

Nacre. *See in Index* Mother-of-pearl

Nadir (*nā'dēr*), in astronomy, the point in the celestial sphere opposite to the zenith; that is, directly underfoot.

Nadir Shah (*nä'dĭr shä*) (1880–1933), ruler of Afghanistan 1929–33; he had served as commander in chief of Afghan army 1919; minister to France 1924–26: A-33

Nadir Shah (1688?–1747), ruler of Persia P-158
diamond D-80
Peacock Throne D-61

Naevius (*nē'vĭ-ŭs*), **Gnaeus** (3d century B.C.), first Roman epic poet L-130

Näfels (*nâ'fĕls*), Switzerland, village in canton of Glarus; at battle here in 1388 Swiss won independence from Austrians.

Naga (*nä'gä*), a number of tribes in the hill country of Assam, India; language Indo-Chinese.

Nagana (*nạ-gä'nạ*), a disease of animals caused by tsetse fly T-203

Nagasaki (*nä-gä-sä'kē*), Japan, seaport on w. coast of Kyushu; pop. 241,805; beautiful natural harbor; coal, cotton goods, rice exports; shipbuilding: *maps* J-297, A-406
atomic bomb W-272, *picture* W-293
Nagler propeller W-68

Nagoya (*nä'gō-yä*), city of Japan; pop. 1,030,635: N-1, *maps* J-297, A-406

Nagpur (*näg'pur*), India, capital of Madhya Pradesh state; pop. 449,099; railway center; cloth manufactures, manganese mines: *maps* I-54, A-407

Naguib, Mohammed (born 1901?), Egyptian army officer and statesman, born Khartoum, Anglo-Egyptian Sudan; served with distinction in Palestine war 1948; seized power after successful revolt against King Farouk 1952; premier and president of Republic of Egypt 1953–54: E-278

Nagyszeben, Rumania. *See in Index* Sibiu

Nahr el 'Asi, in s.w. Asia. *See in Index* Orontes River

Nahua (*nä'wä*) **nations,** Indian tribes inhabiting Mexico in 15th century; allied with Aztecs: A-544

Nahuan, or **Nahuatl, language** A-544

Nahum (*nā'hŭm*) (7th century B.C.), Hebrew minor prophet; his book, the 34th of the Old Testament, foretells the doom of Nineveh: *picture* P-419

Naiads (*nā'yădz* or *nī'ădz*), in Greek mythology, spirits of the springs and fountains N-318

Naidu (*nä'ĭ-dụ*), **Sarojini** (1879–1949), Hindu poet, reformer, and political leader, born Hyderabad, India, of Brahman stock; graduated University of Madras; studied at London and Cambridge Universities, England; broke tradition, 1898, by marrying Dr. M. G. Naidu, medical officer, of lower caste than she; first Indian woman president of Indian National Congress 1925; jailed for Nationalist activities; wrote three books of poetry in English ('The Golden Threshold': 'The Bird of Time': 'The Broken Wing').

Nails, hardware N-1–2, *pictures* N-1–2
scarcity in colonial period A-193*c*, N-2

Nails, of fingers and toes S-193, H-426

Nainsook (*nān'sụk* or *nān'sụk*), fine, soft-finished white cotton fabric with lustrous finish on one side; lighter in weight than longcloth.

Nairne, Carolina (Oliphant), Baroness (1766–1845), Scottish poet; known for lyrics to traditional Scottish tunes ('The Land o' the Leal'; 'O, Charlie Is My Darling'; 'The Laird o' Cockpen'); poems written anonymously, were published after death as 'Lays from Strathearn'.

Nairobi (*nī-rō'bi*), capital of Kenya Colony, British East Africa; pop. 118,976; game-outfitting point; headquarters of Uganda railway: K-35, *maps* E-199, A-46, *picture* K-35

Naismith, James (1861–1939), American educator, born Almonte, Ontario, Canada; professor of physical education, University of Kansas, Lawrence, after 1898
originated basketball B-76

Najaf, An (*ăn nä'jäf*), Iraq, town 90 mi. s. of Baghdad; pilgrimage center: *map* I-224

Nájera (*nä'hä-rä*), **Manuel Gutiérrez** (1859–95), Mexican writer L-128

Naked flowers F-184

Naktong River, in s.e. Korea, flows from north into Korea Strait near Pusan; 326 mi. long; navigable for 214 mi. for motor and sailing boats: *map* K-65

Nambe (*näm-bē'*), N. M., a pueblo about 10 mi. n. of Santa Fe; Nambe people belong to the Tanoan language group of Pueblo Indians: *map* N-178

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place N-3, *pictures* N-2*a*–3. *See also* Fact Summary with each state article for origins of state names
superstitions about M-34
trade N-3

Namib (*nä'mĭb*) **Desert**, arid region along w. coast of South West Africa S-241, 242, *map* S-242

Nampa, Idaho, fruit and dairy center in s.w. of state, 30 mi. from Oregon border; pop. 16,185; named for Indian chief, Nampuh; noted for its potatoes and onions; car shops: *maps* I-21, U-252

Namur (*nä-mür'*), Belgium, fortified industrial town 35 mi. s.e. of Brussels at junction of Sambre and Meuse rivers; pop. 31,444; repeatedly besieged; occupied by Germans 1914 and 1940: *map* B-111
stilts used S-396

'Nana', a novel by Émile Zola (1880) depicting the rise and fall of an untalented but beautiful actress at the time of the Second Empire in France: N-311

Nanai'mo, British Columbia, Canada, port on Vancouver Island opposite Vancouver; in coal-mining region; pop. 7196; coal, gold mining; agriculture, fur trading; exports coal, lumber, herring; *maps* C-68, 80

Nana Sahib (*nä'nä sä'ĭb*) (1825?–60?), Hindu prince, leader in the Indian Mutiny of 1857.

Nanchang (*nän'chäng'*), China, capital of Kiangsi province; pop. 258,692; trade and manufacturing city: *maps* C-260, A-406

Nancy (*năn'sĭ*, French *nän-sē'*), France, fortified city 175 mi. e. of Paris; pop. 108,131; old capital of Lorraine; university, art and antiquity museums: *maps* F-259, 270, E-416, 425
battle (1477) C-195–6

'Nancy', famous brig in American Revolution W-143

Nandu, bird, popular name for rhea R-132

Nanga Parbat (*nŭng'gą pŭr'bąt*), mountain (26,660 ft.) in w. Himalayas, n.w. Kashmir; summit reached on July 4, 1953; as of that date, 2d highest climbed by man.

Nankeen', a cotton cloth first made at Nanking, China, from yellow cotton of that region; now made of ordinary cotton and dyed yellow or brownish yellow.

Nanking', China, city on Yangtze River; pop. 1,084,995: N-4, *maps* C-259, A-406

Nanking Treaty (1842), between China and Great Britain closing Opium War C-279

Nankow Pass, in Great Wall of China P-112

Nanning, China, treaty port and capital of Kwangsi province, in s. China; pop. 202,720; trade center: *maps* C-260, A-407

Nansei Islands, between Formosa and Kyushu. *See in Index* Ryukyu Islands

Nansen (*nän'sĕn*), **Fridtjof** (1861–1930), Norwegian scientist, Arctic explorer, and humanitarian; professor of oceanography at Oslo University; influential in separation of Norway from Sweden, and first minister to England from Norway, 1906–8; after World War I he worked for repatriation of prisoners and directed relief for refugees from Russia and the Near East, for which he received Nobel peace prize in 1922
Arctic explorations P-350*a*, *map* P-346

Nantes (*nänt*), historic city of France; pop. 187,259: N-4, *maps* F-259, E-416, 425

Nantes, Edict of. *See in Index* Edict of Nantes

Nanteuil (*nän'tŭ'yŭ*), **Robert** (1630–78), French engraver; portraits show skillful composition, forceful modeling, truthful characterization; engraver and illustrator in court of Louis XIV.

Nanticoke (*năn'tĭ-kōk*), Pa., coal-mining town on the Susquehanna River 7 mi. s.w. of Wilkes-Barre; pop. 20,160; mining and agricultural implements, silk and rayon yarns: *map* P-133

Nanticoke Indians, an Algonquian Indian tribe formerly living in Maryland.

Nantucket Island, off s.e. coast of Massachusetts; about 15 mi. long; separated from Cape Cod by Nantucket Sound; township of Nantucket (pop. 3484), a summer resort; important historically as whaling center: *map* M-124
Cape Cod Canal avoids shoals C-118

Naomi (*nā-ō'mĭ*), mother-in-law of Ruth R-299, *picture* R-299

Nap, of cloth W-197, *picture* W-196
teasel plant used T-120, *picture* T-120

Napa, Calif., city 35 mi. n.e. of San Francisco; pop. 13,579; prunes, grapes; basalt products, apparel, wine, leather; state hospital; Napa Junior College: *maps* C-34, U-252

Napaeads (*nā-pē'ădz*), in Greek mythology, nymphs of valleys N-318

Naph'tha, an oil distilled from petroleum
soap S-213
solvent for rubber R-241

Naphthalene, coal-tar product C-371

Napier (*nā'pĭ-ĕr* or *nā-pēr'*), **Sir Charles James** (1782–1853). English general, born London, England; fought in Spain and France in Napoleonic wars; in 1841 in India commanded army which conquered the Sind; for six years successfully governed territory he had conquered; a brave soldier, loved by his men.

Napier, or Neper (*nā'pĕr*), **John** (1550–1617), Scottish mathematician, inventor of logarithms L-296

Napier, Robert Cornelis, first **Baron Napier of Magdala**, (1810–90), British field marshal, born Colombo, Ceylon; took part in first and second Sikh wars, relief of Lucknow, and later Indian campaigns; commanded expeditions against Peiho ports in China 1860; captured Magdala, stronghold in Ethiopia in 1868.

Napier, port on e. coast of North Island, New Zealand; pop. 24,538, with suburbs; wool and meat exports: *maps* P-16, N-228, *inset* A-489

Na'ples, Italy, also **Napoli** (*nä'pō-lē*), city of s. Italy, on n. shore, Bay of Naples; pop. 1,003,815: N-4–5, *maps* I-262, E-416, 425, *picture* N-5
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Naples, Bay of, inlet of Mediterranean in s.w. Italy N-4, *picture* N-5

Naples, University of N-5

Naples National Museum, Naples, Italy; established 1738: N-5. *See also in Index* Museums, *table*
Pompeii collection P-367

Napo (*nä'pō*), river rising in Ecuador; flows 700 mi. s.e. to Amazon: *maps* P-164, S-252

Napoleon (*nä-pō'lē-ŏn*, French *nä-pô-lä-ôn'*) **I** (1769–1821), emperor of the French N-6–11, *pictures* N-6–7, 9, 11, *Reference-Outline* F-274*b*. For military campaigns, *see in Index* Napoleonic wars
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Napoleon II. *See in Index* Reichstadt, duke of

Napoleon III (1808–73), emperor of the French N-11–12
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Sardinia-Piedmont aided by I-273, C-158, V-468: Solferino I-273
Victor Hugo opposes H-441

Napoleon, former French gold coin valued at 20 francs, or about $3.86 when current; bore picture of head of Napoleon I.

Napoleonic code N-9
Louisiana Code based on L-333
opposed women's rights W-184

Napoleonic wars (1796–1815) N-7–11, *chart* H-365. *See also in Index* Vienna, Congress of
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Trafalgar, battle of N-109–10
Waterloo, battle of W-66

Napoli, Italy. *See in Index* Naples

Naprapathy (*nä-prăp'ä-thĭ*), system of treating disease by manipulation, based upon theory that most bodily ailments are caused by abnormal strains in ligaments, particularly those of the spine.

Nara (*nä'rä*), Japan, picturesque old city on Honshu, e. of Osaka; capital of Japan 710 to 784; pop. 77,866; contains beautiful ancient temples, shrines, giant Buddha image art museum J-314

Narbada River, or **Nerbudda** (*nĕr-bŭd'ą*) **River**, in India, rises in n. of Central Provinces and flows 750 mi. to Gulf of Cambay; held sacred by Hindus: *maps* I-54, A-407

Narbonne (*när-bôn'*), town in s. France 5 mi. from Mediterranean; pop. 26,301; wines; early Roman colony, Narbo Martius: *map* E-425
Narcissus (*när-sĭs'ŭs*), in Greek mythology N-12
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Narcotics Limitation Convention N-13
Nard. *See in Index* Spikenard
Nares Deep, a depression in floor of Atlantic Ocean, about 700 mi. n.e. of Puerto Rico; depth 22,950 ft.; the most northerly and largest of the 3 deeps which lie n.e. of Puerto Rico; named for British Admiral George Strong Nares (1831–1915).
Narodnaya, Mount, highest point in Ural Mountains (6184 ft.) U-405, *map* R-259
Narragan'set, tribe of Algonquian Indians; lived along w. side of Narragansett Bay, R. I., and controlled surrounding regions
befriend Roger Williams W-140
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threaten Plymouth P-325
Narragansett Bay, inlet of Atlantic, indenting coast of Rhode Island R-142, *map* R-141, *picture* R-136
Providence harbor, *picture* R-135
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Narrows, The, strait between Brooklyn and Staten Island, N. Y. N-215, *map* N-222
Narses (*när'sēz*) (478?–573?), general of Byzantine Empire, grand chamberlain to Justinian J-367
Narva (*när'vą*), port on Gulf of Finland, in Estonian S. S. R.; pop. 23,512; cotton and lumber trade; makes textiles: *maps* E-417, R-266
Narva, battle of (1700) C-195
Narváez (*när-vä'äth*), **Pánfilo de** (1478?–1528), Spanish soldier and adventurer, one of earliest explorers of Florida
Cortez and C-488–9
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Nar'vik, Norway, port on w. coast; pop. 11,141; railway terminus: N-304*b*, *maps* N-301, E-416
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ivory from tusks I-284
Nasal bone, one of the bones forming the arch of the nose S-192
Nasal index, in ethnology R-22
Nas'by, Petroleum V., pen name of David R. Locke (1833–88), humorist, born Vestal, N. Y.; in Ohio after 1852; his "Nasby letters," in favor of Lincoln policy, appeared first in *Findlay Jeffersonian* and later in *Toledo Blade*.
Nascapee, Indian tribe. *See in Index* Naskapi
Naseberry, tropical tree. *See in Index* Sapodilla
Naseby (*nāz'bĭ*), **battle of** C-516, C-191
Nash, Francis (1742?–77), soldier, born Prince Edward County, Va.; settled in Orange County, N. C.; member of assembly 1771, 1773–75, and captain in British army until 1775; twice delegate to provincial congress; advanced to brigadier general of First North Carolina Regiment; fatally wounded in battle of Germantown; monument at Guilford Courthouse, N. C.
Nashville, Tenn., named for N-14
Nash, John (1752–1835), English architect; laid out Regent's Park in London
Buckingham Palace L-304, *picture* L-305
Nash, John Henry (1871–1947), American printer, born Woodbridge, Ontario; printer in San Francisco after 1895; folio edition of Dante probably his best work; one of the best typographers of his time.
Nash, Ogden (born 1902), humorist, born Rye, N. Y.; noted for light satirical verse ('I'm a Stranger Here Myself', 'Good Intentions', 'Many Long Years Ago', 'Versus', 'Family Reunion', 'Parents Keep Out', 'The Private Dining Room').
Nash, Richard (1674–1762), English society leader, popularly called "Beau" Nash; made Bath a fashionable resort, ruled it like a king.
Nash (or Nashe), Thomas (1567–1601), English dramatist, pamphleteer; satirical, sometimes violent, tracts; pioneer in English novel of adventure ('The Unfortunate Traveller; or, The Life of Jacke Wilton').
Nash'ua, N. H., city on Merrimack and Nashua rivers, near Massachusetts boundary; pop. 34 669; shoes, cloth, paper and wood products, machinery, asbestos products, radio and television parts; Rivier College: N-144, 154, *maps* N-151, U-253
Nashville, Tenn., state capital on Cumberland River; pop. 174,307: N-13–14, *maps* T-66, U-253
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Naskapi, also Nascapee (*näs-kä'pē*), Indian tribe that lives in Quebec, *map* I-106*f*, *table* I-107
Nasmyth (*näz'mĭth*), James (1808–90), Scottish inventor
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Nasr-ed-Din (*nä'sr-ĕd-dēn*) (1831–96), shah of Persia; succeeded 1848; introduced postal system.
Nassak, a diamond, *picture* D-79
Nassau (*năs'ô*), capital and seaport of Bahama Islands; situated on New Providence Island, 200 mi. s.e. of Miami, Fla.; pop. 13,231: B-17, *maps* B-17, W-96, U-253
boats at dock, *pictures* B-17, W-95
Nassau (*nä'sou*), former district in central Germany in Rhine basin, now included in state of Hesse.
Nassau, House of, royal family L-354
Nassau (*năs'ô*) grouper, a fish of the sea-bass family, *picture* P-420
Nasser (*nä'sĕr*), Gamal Abdel (born 1917?), Egyptian military leader and statesman; leader of Revolutionary Command Council, ruling military junta; organized revolt that deposed Farouk I in 1952; premier of Egypt April 1954–, president Nov. 1954–.
Nast, Thomas (1840–1902), American caricaturist, born Bavaria; because of cartoons ridiculing those who opposed Civil War called by Lincoln "our best recruiting sergeant"; his keen, satiric cartoons in *Harper's Weekly* helped destroy Tweed Ring
Democratic donkey, *picture* P-357
Republican elephant, *picture* P-357
Santa Claus, first picture of S-43
Tammany tiger, *picture* T-9
Nastur'tium N-14, *picture* N-14
leaf, *picture* L-152
pollen grain, *picture* F-186
Natal (*nạ-tăl'*, Portuguese *nạ-täl'*), seaport near n.e. tip of Brazil, capital of province of Rio Grande do Norte; about 550 mi. from Bahia, 1400 mi. from Rio de Janeiro; take-off point for flights to Africa; port for coastal trade; pop. 97,736: *map* S-252
Natal, province of Union of South Africa; 35,284 sq. mi.; pop. 2,408,433; cap. Pietermaritzburg: N-14, *maps* A-47, S-242
dipping vat for cattle, *pictures* C-146
education S-243
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Natale (*nä-tä'lā*), Italian Christmas C-299
Natchaug (*nă-chąg'*) River, Conn., a stream uniting with the Willimantic River to form the Shetucket River, *maps* C-438, 445
Natch'ez, Indian tribe that formerly lived in Mississippi, *picture* I-99, *table* I-107
Natchez, Miss., industrial city and port on Mississippi River; pop. 22,740; exports cotton and beef cattle; cotton and cottonseed-oil mills, packing plants, lumber mills; settled as Fort Rosalie by Bienville (1716); occupied by Federal troops in 1863: *maps* M-303, U-253
Natchez Trace, road R-161, N-38*d*, *map* R-159
Natchitoches (*năk'ĭ-tŏsh*), La., parish seat of parish of same name. 72 mi. s.e. of Shreveport, on Red River; pop. 9914; founded 1713–14 by French; Northwestern State College of Louisiana: S-308, *map* L-330
Na'than, Hebrew prophet; rebuked David for treachery to Uriah (II Sam. vii, xii).
Nathan, George Jean (born 1882), editor, author, dramatic critic, born Fort Wayne, Ind.; one time editor, with H. L. Mencken, of *The Smart Set* and *American Mercury* ('The Popular Theatre'; 'Comedians All'; 'Art of the Night'; 'Since Ibsen'; 'Autobiography of an Attitude').
Nathan, Robert (born 1894), writer, born New York City ('A Winter Tide', 'The Green Leaf', poems; 'Portrait of Jennie', 'Mr. Whittle and the Morning Star', 'The River Journey', 'The Married Look', prose).
Na'tick, Mass., town on Charles River at head of Cochituati Lake 15 mi. s. of Boston; pop. of township, 19,888; boots and shoes, baseballs, paper boxes, tools; founded 1650 by John Eliot as a home for Indian converts: *map, inset* M-132
Nation, Carry A. (1846–1911), reformer, born Kentucky; in prohibition crusade aroused sensation by smashing Kansas saloons operating in defiance of anti-liquor laws.
Nation N-15–16*a*, *tables* N-16–16*a*
member nations of international organizations, *table* N-16*a*
nations of the world, *table* N-16–16*a*
National Academy of Design A-5
National Academy of Sciences, American society incorporated 1863 for purpose of making investigations and reports, at call of U. S. government, on any subject of science or art; meetings held in Washington, D. C.
National Air Museum, U.S. A-537
National Americanism Commission, of American Legion A-223
National American Woman Suffrage Association W-184
National Archives, The, at Washington, D.C., created by act of Congress 1934 to inspect and preserve

NATIONAL FLOWERS

Many countries have adopted flowers as national emblems. In other lands while no flower has been officially adopted, a certain flower may be so typical of a country or may have become so closely associated with its history, literature, or folklore that it has come to be regarded as the national flower. Below are listed the chief countries in which a national plant or flower has been adopted by official decree or by common consent. The United States has no official national flower although the goldenrod and other flowers have been suggested.

Australia	Golden wattle	Ireland	Shamrock
Belgium	Azalea	Japan	Chrysanthemum
Canada	Maple leaf	Netherlands	Tulip
China	Plum flower	Paraguay	Orange blossom
Denmark	Forget-me-not	Poland	Cornflower
Egypt	Lotus	Rumania	Rose
England	Rose	Scotland	Thistle
France	Iris (Fleur-de-lis)	Spain	Red carnation
Germany	Cornflower	Switzerland	Edelweiss
Greece	Laurel	Wales	Leek
Hungary	Tulip	Yugoslavia	Lily of the valley
Iran (Persia)	Red rose		

archives and records of the U.S. government, historical material, and motion pictures of historical activities; publishes the *Federal Register*.
building W-28, *map* W-30, *picture* U-347: U. S. documents in D-35, *pictures* U-345, C-319*a*

National Assembly, French parliament F-266, *map* P-83*a*
French Revolution F-292–3, E-399

National Association for the Advancement of Colored People (NAACP), organization founded 1909 to safeguard civil, legal, economic, and political rights of colored people; national headquarters New York City.

National Association of Manufacturers, an organization founded 1895; composed of, and promotes interests of, individuals, firms, and corporations engaged in manufacturing.

National Association of Professional Baseball Leagues B-64, 72

National Association of Student Councils, founded 1931 by National Association of Secondary-School Principals (a department of National Education Association); aim, to foster in secondary schools through authorized student activities the spirit of responsibility, leadership, self-discipline, and citizenship and to promote a balanced school program and acceptable, integrated standards; 6025 chapters in 1954; headquarters, Washington, D.C.

National Audubon Society. *See in Index* Audubon Society, National

National Aviation Day F-57

National banks, U. S. B-50, 52
Federal Reserve membership F-49
supervision U-360

National Baseball Congress B-70

National Baseball Hall of Fame and Museum B-70. *See also in Index* Baseball Hall of Fame and Museum, National

National Baseball Museum B-70

National Basketball Association B-75*b*–6

National battlefield sites N-38*e*

National Board of Fire Underwriters, in New York City; established 1866; protects interests of fire-insurance companies, establishes safety standards in building construction, represses incendiarism and arson: *picture* S-6

National Book Award, The, instituted in 1950 by its sponsors, American Book Publishers Council, Inc., American Booksellers Association, Inc., and Book Manufacturers' Institute, Inc.; presented annually to American writers for fiction, nonfiction, and poetry; gold medal.

National Broadcasting Company (NBC) R-48

National Bureau of Standards P-236

National Button Society B-370

National Cancer Institute, at Bethesda, Md., created 1937 by act of Congress; conducts researches, investigations, experiments relating to the cause, prevention, diagnosis, and treatment of cancer. A division of the U.S. Public Health Service.

National Capital Parks, in United States N-20

National Capital Planning Commission W-28

National Cathedral, The. *See in Index* St. Peter and St. Paul, Cathedral Church of

National Catholic Welfare Conference (NCWC), an agency to promote welfare of Roman Catholics in U. S.; organized 1919; has five departments: education, press, social action, laws, lay organization; succeeded National Catholic War Council, founded 1917.

National cemeteries, U. S. N-16*b*–17, *pictures* N-16*b*–17
Cemetery Hill G-106

National Citizen's Commission for the Public Schools E-261

National City, Calif., residential and trading city on San Diego Bay, 5 mi. s. of San Diego; pop. 21,199: *map* C-35

National Civic Federation, an organization founded in 1901 for the study of social and industrial problems; executive committee comprises representatives of the public, employers, and wage earners.

National Collegiate Athletic Association (N.C.A.A.), organized 1905, to maintain high standards in intercollegiate athletics; makes playing rules, conducts championships.

National Commission for the Defense of Democracy Through Education E-261

National Committee for Mental Hygiene M-173

National Committee on Boys and Girls Clubs F-252*b*

National Conference on Citizenship C-320

National Congress of Mothers P-80

National Congress of Parents and Teachers P-80

National Conservation Commission C-454

National Consumers' League, organized 1898 to regulate conditions of manufacture by helping to enforce labor laws, investigating conditions of labor, and awarding league's label to manufacturers conforming to its standard; state leagues in U. S. since 1891.

National convention. *See in Index* Convention, in U. S. politics

National Council of Geography Teachers G-47

National Council of the Churches of Christ in the United States of America, an interdenominational organization representing 29 U.S. denominations for purpose of co-ordinating efforts in matters of religious and moral interest; formed 1950 through merger of Federal Council of Churches of Christ in America with seven other interdenominational agencies; headquarters New York City.

National Council of Women of the United States W-185

National debt N-17, *table* N-17
reparations, World War I. *See in Index* Reparations
United States N-17, U-393
Debt Funding Commission W-242–3
14th Amendment U-355
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Liberty bonds W-236
war debts N-17: World War I W-241–3, *pictures* W-243, 244, *table* N-17; World War II, *table* N-17

National Defense Act (1916), U.S. W-234

National Defense Advisory Commission, appointed May 1940 by President Franklin D. Roosevelt to serve the then re-established Council of National Defense (created by Congress 1916); consisted of commissioners in charge of industrial production, raw materials, employment, farm products, transportation, price stabilization, consumer protection; many of its duties taken over (1941) by Office for Emergency Management.

National Defense Building. *See in Index* Pentagon

National Doll and Toy Collectors Club, Inc. D-121–2

National Education Association, American society of educators, organized at Philadelphia, Pa., 1857; devoted to the study of methods, organization, and courses of study in educational work: E-261
cardinal principles of education E-251
Committee of Ten on Secondary School Subjects E-251
National Conference on Citizenship C-320

National Emergency Council (NEC), U.S. R-205

National Farmers Union. *See in Index* Farmers Educational and Cooperative Union of America

National Federation of Business and Professional Women's Clubs, Incorporated, The, an organization founded 1919 to elevate standards for business and professional women and promote their interests; 160,000 members; 2800 local clubs; publishes *Independent Woman*; headquarters New York City.

National flower, a flower, leaf, or plant adopted as a national symbol. *See table* on this page

National Football League F-232–3, *table* F-232

National forests. *See* Fact Summary with each state article; *also see in Index* Forests and forestry, *subhead* national forests

National Foundation for Infantile Paralysis V-433*d*

National 4-H Club Camp F-252*a*

National 4-H Club Congress F-252*a*

National 4-H Club Foundation of America, Inc. F-252*b*

National Gallery, London, England, on Trafalgar Square, built between 1832 and 1838; several times enlarged; rich in Italian works; Flemish and Dutch schools and early British masters well represented; a branch, Tate Gallery, houses

modern British sculptures and paintings: L-305, *map* L-301
Jan van Eyck's 'The Marriage of Giovanni Arnolfini and Giovanna Cenami' P-25*a–b*, *color picture* P-25*a*
Uccello's 'Battle of San Romano' P-26, *color picture* P-26

National Gallery of Art, Washington, D. C., one of the world's great art museums, established 1937, opened 1941. The $15,000,000 building, gift of Andrew W. Mellon, is built of pink Tennessee marble and stands on the north side of the Mall, between 4th and 7th Streets. Designed by John Russell Pope to house Mellon's $50,000,000 collection and later contributions, such as the Samuel H. Kress and the Joseph E. Widener collections. The gallery is administered as a bureau of the Smithsonian Institution: W-31, *map* W-30, *picture* W-28. *See also in Index* Museums, *table*
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Constable's 'A View of Salisbury Cathedral', *color picture* P-29*c*
Desiderio da Settignano's 'Laughing Boy' S-78*b*, *picture* S-78*b*
Giorgione's 'Adoration of the Shepherds', *picture* G-110
Goya's 'Señora Sabasa García', *color picture* P-31*a*
Homer's 'Breezing Up', *color picture* P-32
Manet's 'The Dead Toreador' P-31*b*, *color picture* P-31*b*
Memling's 'Madonna and Child with Angels' P-25*b*, *color picture* P-25*c*
Reynolds' 'Lady Elizabeth Delmé and Her Children', *color picture* P-29*d*
Rogier van der Weyden's 'Portrait of a Lady' P-25*b*, *color picture* P-25*b*
Stuart's portraits of George Washington, *picture* W-19, *color picture* P-30
Veronese's 'The Finding of Moses' P-27*a*, *color picture* P-27*a*
West's 'Colonel Guy Johnson' P-31*a*, *picture* W-92, *color picture* P-31
Whistler's 'The White Girl: Symphony in White, No. 1' P-31*d*, *color picture* P-32

National Geographic Society, American organization with headquarters at Washington, D. C., founded 1888 to encourage exploration and observation and to spread geographic knowledge: G-47

National Grange, or Patrons of Husbandry, a major farm organization and a farm fraternity for farmers and their families, the oldest of the farm organizations; founded 1867 by Oliver H. Kelley, a Minnesota farmer, then on staff of Department of Agriculture; organized in 37 states, with more than 860,000 members; sponsors Juvenile Grange for boys and girls under 14; headquarters in Washington, D.C.
railroad rates movement A-391

National gross product. *See in Index* Gross national product

National Guard, U.S., a militia force organized in each state; composed of volunteers who take part-time army training through attending weekly armory drill and two-week summer camp; subject to call by governor for disaster or emergency duty; or by federal government in national emergency: A-383
Air Force A-81*a*

National Home for Disabled Volunteer Soldiers, organized 1865 V-466

National Homes, Bureau of, government bureau in charge of national homes for disabled soldiers and sailors, established by Congress at end of Civil War.

National Honor Society of Secondary Schools, an organization founded 1921 by National Association of Secondary-School Principals (a department of National Education Association); members must be outstanding in scholarship, leadership, service, and character; society open to students in grades 10, 11, and 12; 3,500,000 members and 4725 chapters in U.S., Philippines, Puerto Rico, Hawaii, Panama, Argentina, and China; headquarters, Washington, D.C.
mock election, *picture* J-368*a*

National Housing Agency (NHA), U.S. R-205

National income, U.S. U-329–30

National Industrial Recovery Act (1933), U.S. M-360, R-206–7

National Institute of Health, headquarters at Washington, D.C.; a division of the U.S. Public Health Service for study of causes and prevention of diseases; developed from a bacteriological laboratory established 1887 at Marine Hospital, New York City; got present name 1930; field stations throughout U.S.

National Inventors Council, branch of U. S. Department of Commerce in national defense program; created 1940; made up of scientific, technical, military experts with duty of examining inventors' discoveries and mechanisms for defense value.

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National Labor Relations Act of 1935 (Wagner act), U.S. L-72, R-209

National Labor Relations Board (NLRB), U.S. L-72, 73, U-368

National League, in baseball B-63–5, 72

National League of Women Voters. *See in Index* League of Women Voters

National Legion of Decency M-431

National Military Establishment, U. S., former name of U.S. Department of Defense T-198, U-360. *See also in Index* Defense, Department of

National military parks, U.S. N-38*e*

National monuments. *See in Index* National parks and monuments

National Museum, United States. *See in Index* United States National Museum

National Music Camp, Interlochen, Mich., summer school of music and allied arts; nonprofit; founded 1928: B-46*a*

National parks and monuments N-18–39, *maps* N-18, 38*f*, *pictures* N-31–2, 34, 37–8*b*, *d–f*, *color pictures* N-19–29. *See also in Index* names of various parks
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National Parks Association, in U. S., a conservation organization C-454*b*, N-21

National Park Service, U. S. N-20–1
national cemeteries N-16*b*, 17

National parkways N-38*d–e*

National Pike. *See in Index* Cumberland Road

National Police Academy F-49

National Production Authority (NPA), U. S. U-368

National Reclamation Act (1902), U.S. I-250–1

National Recovery Administration (NRA), U.S. R-205, 206, 208, 209

National Recreation Association, founded 1906; recreation programs for home, church, school, and for industrial workers; headquarters, New York City: P-86*a*

National Research Council, Canada C-90

National Research Council, Washington, D. C., established 1916 by National Academy of Sciences to solve military problems; duties now embrace promotion of mathematical, physical, and biological sciences and their application to engineering, agriculture, medicine, and other useful arts; supported by Carnegie Corporation, Rockefeller Foundation, and other funds.

National Resources Planning Board (NRPB), U.S. R-205

National Rifle and Pistol Matches, U.S. R-153*a–b*

National Rifle Association of America R-153*a–b*, F-81

National Roadside Council, a conservation organization C-454*b*

Nationals, legal term for the citizens or subjects of a nation
foreign jurisdiction over I-189

National Safety Council S-4, 8, A-513

National Science Foundation, established by Congress 1950 to foster basic research in mathematical, physical, medical, biological, engineering, and other sciences; consists of director and 24-man board appointed by president of U.S. and confirmed by Senate: U-368

National Security Council, U. S. U-358

National Skeet Shooting Association F-81

National Socialist party (Nazi). *See in Index* Nazi

National songs N-40–3, *pictures* N-40, 42–3

National Story League S-406*a*

National Tea Company, a retail food chain store company; founded Illinois *Feb. 6, 1902*; *self-service* stores; about 15% of products sold are manufactured, processed, or packaged under trade names controlled by company.

National territory, in international law I-190

National Trust for Historic Preservation, a private organization chartered by Congress 1949 with the power to accept, hold, and administer sites, buildings, and objects significant in American history and culture; also functions as a clearinghouse for information and techniques in the field of preservation; 1000 individual members and 125 member organizations in 1953; issues quarterly publication, *Historic Preservation;* headquarters Washington, D.C.

National Urban League, an organization founded in 1910 for the improvement of economic and social conditions of Negroes living in cities; branches in 56 cities.

National War College, U. S., at Washington, D. C. A-385

National War Labor Board (1918), U. S. T-5

National War Labor Board (NWLB) (1942), U. S. R-215

National Wild Flower Preservation Society C-454*b*

A LIST OF NAUTICAL TERMS

Abaft, aft, after. Toward the stern of a vessel: *abaft* the mainmasts; to walk *aft;* the *after* engine room.

Abeam. Off to the side of the ship and even with her.

Aloft. Above the weather deck.

Amidships. On the center line of the ship.

Anchor. A heavy metal device for holding a vessel fast to the bottom. All anchors have a *ring* at the top for the anchor chain, a vertical *shank*, and *flukes* which bite into the bottom. An old-fashioned anchor has a horizontal *stock* just below the ring; the curved flukes are set at right angles to the stock. A "patent" anchor has no stock; its flat flukes are in the same plane.

Astern. Backward; behind the vessel.

Athwartships. At right angles to the fore-and-aft line of the vessel.

Ballast. Anything used for a weight to keep a ship seaworthy when she is sailing or steaming without cargo; she is then said to be "in ballast."

Batten. A thin strip of wood placed in a pocket in the leech of a sail to stiffen it; timber or metal bar used in fastening, or *battening down*, a hatch.

Beam. The width of a vessel at her widest part. *Abaft the beam*, in a direction between abeam and astern.

Bearings. The directions in which points lie relative to some line. *True* bearings are given relative to true north; *relative* bearings, to the ship's heading.

Belay. To fasten a rope.

Bells. Strokes of the ship's bell used to indicate the time of day. Eight bells indicates 12, 4, or 8 o'clock, one bell a half hour later, two bells an hour later, and so on to eight. The strokes are sounded in groups of two.

Bend. A knot which fastens one rope to another; to *bend on* a sail is to fasten it to the spars which support it.

Berth. The anchoring or mooring position for a vessel; sleeping space assigned to a member of the ship's crew.

Bilge. The curved part of the bottom of the ship's hull. *Bilge water* is water which collects in the bilge.

Bitts. A post, or usually a pair of posts, fastened to the deck of a vessel for attaching the mooring lines or towing hawsers.

Block. A casing fitted with grooved wheels (*sheaves*) through which a rope may be passed for hoisting or hauling.

Bollard. A post on a pier to which mooring lines may be fastened.

Boom. A spar used for holding the foot of a fore-and-aft sail, one end being movably fastened to the mast; also a similar spar for hoisting cargo.

Bow. The forward part of a ship; *on the bow*, in a direction between abeam and dead ahead.

Boxing the compass. Naming the 32 points of the compass from north around through east back to north.

Brace. Rope used to move a yard horizontally.

Bridge. An elevated part of a vessel running athwartships for the use of the navigating officers.

Broach to. To swing toward the wind unintentionally.

Brow. A portable gang plank.

Bulkhead. A partition in the hull of a ship.

Bunker. That part of a vessel's hull where the coal or other fuel is carried.

Buoy. A floating marker; red, cone-shaped *nun buoys* mark the right side of a channel as viewed from the sea, and black, cylindrical *can buoys* mark the left side.

Cable. A heavy rope or chain, generally used to connect anchor to ship.

Capstan. Vertical drum on a windlass, used to handle lines in hoisting or hauling; formerly manned by the crew with capstan bars, now usually power-driven.

Carvel-built. Built with the planking flush on the outside.

Cast off. To let go mooring lines.

Caulk. To fill the seams of a wooden vessel in order to make them watertight.

Centerboard. A plate or board on a sailboat, arranged to drop through a well in the bottom of a boat to act as a keel.

Chains. A platform near the bow of a ship for the leadsman.

Chine. Angular part of the hull of a boat between side and bottom.

Chock. A metal fitting used as a lead for lines.

Cleat. A two-horned device to which a line may be secured.

Clew. The clew in a square sail is either lower corner; that of fore-and-aft sail is the after lower corner. The loop and thimbles in the corner of a sail; also to haul up a square sail for furling, as "clew up," or to lower a yard, as "clew down."

Clinker-built. Built with the planking overlapped.

Close-hauled. Arrangement of sails for sailing as close to the wind as possible.

Coaming. A vertical strip around a cockpit, skylight, or hatch to keep out water; a high sill in a bulkhead opening.

Cockpit. An open space in small vessels which is lower than the deck; the tiller or wheel is located here.

Come about. To tack.

Cringle. A reinforced eyelet in a sail, used for holding it to a spar.

Davits. Vertical metal pillars, with the upper ends bent over, to which a small boat is attached. They turn to allow the boat to be raised from the deck and then swing out clear of the side for the boat to be lowered.

Dead reckoning. Finding the position of a vessel by a record of the courses followed and the distances traveled on each. An *estimated* position differs from a dead reckoning (or "D.R.") position by taking account also of the effects of wind and current. "Dead" is a corruption of "ded." short for *deduced*.

Dinghy. Any of several small boats.

Dog. A small metal fitting to secure watertight doors, hatch covers, etc.

Downhaul. A rope for hauling down a sail.

Draft. The depth to which the hull of the vessel sinks in the water.

Fake down. To lay a rope down in figure-of-eight turns for ease in running it out.

Fall off. To cause a vessel's bow to drop away to leeward of her course.

Falls. Tackle used in hoisting and lowering a boat.

Fantail. On naval vessels, the after section of the main deck.

Fid. A tapered wooden pin used in splicing rope.

Foot. The lower edge of a sail.

Fore-and-aft. In the direction of the keel.

Forecastle. The forward part of the hull under the main or weather deck; on sailing ships, the crew's compartment was located here.

Foul. Tangled, not clear.

Freeboard. The vertical distance between the main deck of a vessel and the water line.

Furl. To wrap a sail tightly on a yard, stay, or mast.

Gaff. The spar to which the head of a fore-and-aft sail is secured.

Galley. Kitchen.

Gangway. A passageway for entering or leaving a ship; stairs fitted to the side of a ship for the same purpose.

Gasket. A short line for securing furled sail.

Gear. The general name for ropes, blocks, spars, and equipment of other sorts.

Go about. To tack.

Grommet. A ring of rope formed by a single strand laid three times around.

Gunwale. The upper edge of a vessel's side.

Halyard. A line for hoisting a sail, yard, or flag.

Hatch. An opening in the deck of a vessel; the cover for such an opening.

Hawser. A heavy line used for mooring, towing, etc.

Head. The upper edge of a quadrilateral sail; the forward part of a vessel; also the vessel's toilet.

Heading. The direction steered by a vessel.

Headsail. A sail set forward of the foremast.

Headway. Forward motion of a vessel.

Heave. To throw; the rise and fall of a vessel in a seaway.

Heave to. To stop a vessel's headway, usually by bringing her into the wind.

Heel. To lean over (said of a sailing vessel or boat).

Helm. The whole steering apparatus of a vessel; also, specifically, the tiller.

Hold. The main cargo space below the lowest deck.

Hull. The body of a vessel.

Jib. A triangular headsail.

Jibe. To steer so far off the wind that the wind catches the sails on the opposite side (said of a fore-and-aft rigged sailboat).

Jury rig. A makeshift rig.

Keel. A timber or series of plates running the length of the bottom of a vessel from stem to stern on the center line, to which the ribs are attached.

Keelson. Wood or steel reinforcement bolted on top of the keel to strengthen the vessel.

Larboard. An old word for port.

Lead line. Line secured to the lead, used for soundings.

Leadsman. Man detailed to heave the sounding lead.

Leech. The after edge of a fore-and-aft sail.

Leeward. Away from the wind.

Leeway. The drift of a vessel to leeward caused by the wind or tide.

Line. A rope used for a specific purpose.

Luff. To turn the head of a sailing ship into the wind.

Marline. A small rope or cord of two strands, usually tarred, often used for "whipping" or winding the ends of large lines.

Marlinespike. A tapered iron pin used for spreading the strands of wire rope in making a splice.

Oakum. A caulking material made from tarred hemp fiber.

Overhaul. To overtake (said of vessels).

Painter. A rope at the bow of a small boat, used to make her fast.

Pay out. To let out chain, or to slack off a line.

Point. To head close to the wind; one of the 32 main divisions of a compass card; hence, 1/32 of a circle (11¼ degrees).

Poop. A raised deck at the stern of a vessel.

Port. The left-hand side of the ship as seen when looking forward; also a porthole or circular opening in the side of a ship. A vessel is on the *port tack* when sailing with the wind coming over the port side.

(Continued on the next page)

A LIST OF NAUTICAL TERMS—*Concluded*

Quarter-deck. On sailing vessels, a part of the weather deck reserved for the officers of the vessel; on naval vessels the part of the deck where the officer of the deck stands his watch in port.
Ratline. A small rope fastened between a vessel's shrouds to form the rungs of a ladder.
Reef. To shorten the sail by folding or tying a portion of it to the yard or boom.
Reef points. Short pieces of rope set in a sail and used in reefing.
Reeve. To pass a rope through any lead.
Rigging. The ropes of a vessel. *Standing rigging* is not movable. *Running rigging* is movable.
Scope. The length of anchor chain out.
Scuppers. Holes in the side of a vessel at the deck level for draining the water from the deck.
Sea anchor. A drag thrown overboard to the windward of a disabled vessel to keep her head into the wind while riding out a storm; usually a conical canvas bag.
Secure. To make fast.
Shackle. A U-shaped metal link closed with a *shackle pin* across the open ends.
Sheave. Small wheel with a grooved rim, usually enclosed in a *block*.
Sheet. A line attached to a sail to regulate its angle to the wind; the open spaces between the thwarts and the ends of a small boat as the *foresheets* and *sternsheets*.
Ship. To put in place; to take on board; to send cargo on board; to enlist.
Shrouds. Part of the standing rigging, consisting of two or more ropes, usually wire, from the masthead to the gunwale of a ship; on large vessels they are generally fitted with ratlines.
Small stuff. Small rope as marline, ratline, etc.
Spar. Any mast, yard, or boom.
Spinnaker. On racing yachts, an extremely large triangular headsail used in running before the wind.
Stanchion. A post or pillar placed upright in a ship.
Starboard. The opposite of port. The right-hand side of a ship when looking forward. A vessel is on the *starboard tack* when sailing with the wind coming over the starboard side.
Stay. A rope used to brace a mast or yard.
Stem. Extreme forward timber in a vessel to which the sides are joined.
Stern. The after end of a vessel.
Sternway. Backward motion of a vessel.
Stop. A piece of small stuff or canvas used to secure something.
Stow. To put in place.
Strake. One continuous line of planking or plates on a vessel's bottom or sides.
Tack. To change the course of a sailing vessel by putting her bow across the wind, bringing the wind on the other side; the lower forward corner of a fore-and-aft sail.
Tackle. A system of blocks and ropes to increase hauling power.
Taffrail. The railing placed around the stern of a ship.
Throat. The forward upper corner of a quadrilateral fore-and-aft sail.
Thwart. A seat in a boat.
Tiller. A wood or iron bar fitted into the head of the rudder, used to turn the rudder.
Top. A platform at the foot of each topmast on a sailing ship.
Topside. On or above the main deck
Trim. The angle to the horizontal at which a vessel rides; shipshape; to handle the sheets to make the most out of the wind.
Two-block. To take up on a tackle as much as possible; to run a flag up all the way.
Underway. When a vessel has no connection with land it is underway.
Unship. To remove from its place.
Waist. The central part of the ship.
Warp. To move a vessel by hauling on lines made fast to bollards.
Watches. The periods into which the day is divided. These are: first watch, 8:00 P.M. to midnight; midwatch or middle watch, midnight to 4:00 A.M.; morning watch, 4:00 A.M. to 8:00 A.M.; forenoon watch, 8:00 A.M. to noon; afternoon watch, noon to 4:00 P.M.; first dogwatch, 4:00 P.M. to 6:00 P.M.; second dogwatch, 6:00 P.M. to 8:00 P.M. The dogwatches are short so as to allow time for an evening meal. A *watch* is also all the crew members on duty at one time; when the crew is divided into two watches, these are called the port and starboard watches.
Weather. The wind; exposed to the wind. The *weather side* is the windward side. A *weather deck* is any open deck.
Whip. To bind the end of fiber or wire rope so as to prevent its unlaying.
Wildcat. Drum on a windlass constructed to handle the anchor chain.
Winch. A horizontal power windlass used to haul on heavy lines.
Windward. Toward the wind.
Yard. A spar set athwartships on which a sail is bent.
Yaw. To swing from side to side; to steer wildly because of a heavy sea.

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NATO. *See in Index* North Atlantic Treaty Organization
Natrium, Latin name for sodium, *table* C-211
Natron (*nā'trŏn*), native sodium carbonate crystallized with water M-265. *See also in Index* Soda glassmaking G-123
Nattier (*nät-yā'*), **Jean Marc** (1685–1766), French portrait painter; portraits of Peter the Great and noted ladies of Louis XV's court ('Magdalen' in Louvre).
Natural, in music. *See in Index* Music, *table* of musical terms and forms
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Natural Bridge of Virginia, on U.S. highway No. 11, 39 mi. n. of Roanoke; used as shot tower during Revolutionary War; Henry Clay said, it "spans a river, carries a highway, and makes two mountains one"; V-478
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Natural dam, how formed E-183
Natural gas. *See in Index* Gas, natural
Natural history, the study of nature in general; forerunner of the sciences of biology and ecology: B-147, E-214. *See also in Index* Nature study
Natural History, American Museum of, New York City. *See in Index* American Museum of Natural History
Natural history museums. *See in Index* Museums, *table*
Naturalism, in literature, the tendency to reproduce life as it appears, without idealization, to show human motives and emotions; represented in France by Zola and the Goncourts; in England by Hardy and Gissing; in United States by Dreiser and Sherwood Anderson: N-311
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Nature worship, adoration of forces and objects in nature. *See also in Index* Animal worship; Fire worship; Mythology; Sun worship
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Nau, Jean David, late 17th-century French pirate; alias Francis L'Ollonais; intensely cruel; plundered in Caribbean; captured and tortured to death by Darien Indians.
Naucratis (*nạ'krà-tis*), Greek colony in 6th century B.C. on Nile Delta, Egypt, 50 mi. s.e. of Alexandria.
Nau'gatuck, Conn., borough on Naugatuck River about 5 mi. s. of Waterbury; pop. 17,455; chemicals, rubber footwear: *map* C-444
Naugatuck River, tributary of the Housatonic River, 65 mi. long, *maps* C-438, 444
Nauheim (*nou'hīm*), or **Bad-Nauheim,** Germany, watering place in Taunus Hills 22 mi. n. of Frankfort-on-the-Main; saline springs.
Nauplia (*nô'plī-ạ*), Greece, fortified seaport in south; pop. 7960; commercial center; ancient and medieval tombs and buildings.
Nauru (*nä-ụ'rụ*), coral island in Pacific 26 mi. s. of equator: 8 sq. mi.; pop. 3269; valuable phosphate deposits; Nauru captured from Germans in World War I; became British mandate 1920; in 1947 became trusteeship administered by Australia for Australia, New Zealand, and Britain as joint administering authorities: *map* P-16
Nauset (*nạ'sĕt*), an Algonquian Indian tribe formerly living on Cape Cod, Mass.
Nausicaä (*nô-sĭk'ă-ạ*), in the 'Odyssey', Phaeacian princess who befriended Odysseus O-344–5
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'Nautilus', U.S. Navy atomic-powered submarine S-438, *pictures* N-87, I-204
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Nauvoo', Ill., village on Mississippi River 40 mi. n. of Quincy; pop. 1242; founded by Mormons 1839: *map* I-36
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Navajo, or **Navaho** (*năv'ạ-hō*), Indian tribe that lives in Arizona, New Mexico, and Utah I-104*c–d*, *map* I-106*f*, *pictures* I-105, 108*a*, *color pictures* I-104*c*, U-249, *table* I-107
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Navajo Indian Reservation, largest Indian reservation in U. S. (nearly 16,000,000 acres), located mainly in Arizona, extending into New Mexico, Colorado, and Utah; occupied by about 60,000 Navajos who engage in sheep raising, farming, blanket weaving, and silversmithing: *maps* A-352, N-171, *picture* I-110*d*
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Naval conference. *See in Index* Armament, limitation of
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American Nautical Almanac O-326
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Naval operations, chief of U-362
Naval Personnel, Bureau of N-90
Naval Reserve, force to supplement regular Navy forces in time of war or emergency. U.S. Naval Reserve established 1915; term of enlistment is two, three, or four years; recruit must be 17 to 50 years old: N-89
Naval stores, wood distillation products, including resin, tar, pitch, and turpentine W-187. *See also in Index* Resins; Tar; Turpentine
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Naval War College, for advanced training of Navy officers, conducted by officers of U.S. Navy at Newport, R.I.; three one-year courses and a correspondence course offered.
Navarino (*nä-vä-rē'nō*), **battle of** (1827) G-191
Navarre (*nà-vàr'*), medieval kingdom on both sides of Pyrenees; now divided between France and province of Navarra in Spain: *map* F-270
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Naxos (*năk'sŏs*), Greek Aegean island, largest and most fertile of Cyclades; 163 sq. mi.; pop. 20,132 famous wine; center of worship of Dionysus; ravaged by Persians 490 B.C.; occupied by Venetians 1207; captured by Turks 1566: *maps* G-189, B-23
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Nayarit (*nä-yä-rēt'*), Mexico, state on central w. coast; until 1917 territory of Tepic; 10,444 sq. mi.; pop. 291,088; cap. Tepic (pop. 24,600): *map* M-194

Nazarene, Church of the. *See in Index* Church of the Nazarene
Nazareth (*năz'ă-rĕth*), Israel, town 65 mi. n. of Jerusalem; pop. 20,067; much visited by pilgrims; great Church of the Annunciation; boyhood home of Jesus: *maps* I-256, P-45, B-138
Nazareth College, at Louisville, Ky.; Roman Catholic; for women; founded 1920; arts and sciences.
Nazareth College, at Nazareth, Mich.; Roman Catholic; for women; founded 1897; arts and sciences.
Nazareth College of Rochester, at Rochester, N.Y.; Roman Catholic; for women; founded 1924; arts and sciences.
Naz'arites, name given among the Hebrews to certain men who consecrated themselves to God in accordance with the Law of the Nazarites given in Numbers vi.
Nazi (*năt'sĭ*), popular name of National Socialist party of Germany G-98–100, 101, H-385
Munich, home of party M-449, 450
Nazilsm, a political doctrine G-98–100
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Nazimova (*nạ-zĭm'ō-vạ*), Alla (1879–1945), actress, noted for work in Ibsen's plays; born Russia; New York debut 1905: *picture* D-135
Neagh, Lough (*lŏĸ nā*), Northern Ireland, largest lake in British Isles; 153 sq. mi.: I-231, *maps* B-321, 325
Neale, John Mason (1818–66), English divine and scholar; translated ancient and medieval hymns ('Jerusalem the Golden'; 'Brief Life Is Here Our Portion'); founded Anglican sisterhood of St. Margaret; wrote on ecclesiastical subjects.
Neanderthal (*nā-ăn'dĕr-tăl*) man M-69
Saldanha man a type M-70
Neapolis (*nē-ăp'ō-lis*), ancient Greek settlement on site of Naples N-5, *map* G-197
Neap (*nēp*) **tide** T-130, *diagram* T-130
Nearctic region, one of the six zoogeographical regions of the world Z-361
Near East, historically a term for region including Turkey, Syria, Lebanon, Palestine, Egypt, n. Arabia, and Mesopotamia. Not to be confused with Middle East.
Near Islands, westernmost group of Aleutians, *map* A-135
Nearsightedness, or myopia E-462
spectacles for S-330
Neat's-foot oil L-339
Neb-neb, an African acacia A-5
Nebo, Assyrian god of learning who is said to have invented writing; Mount Nebo named for him.
Nebo, a mountain in Palestine from which Moses saw the Promised Land; perhaps the modern Jebel Neba (2650 ft.) near Dead Sea: *map* B-138
Nebraska, a n.-central state of the U. S.; 77,227 sq. mi.; pop. 1,325,510; cap. Lincoln: N-95–106, *maps* N-102–3, 95, 99, U-252–3, 286, *pictures* N-95–6, 100, 105
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song, state N-97
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Nebraska, University of, at Lincoln, Neb.; state control; founded 1869, opened 1871; arts and sciences, agriculture, business administration, dentistry, engineering, fine arts, home economics, journalism, law, medicine, music, nursing, pharmacy, speech, teaching; graduate college: *picture* N-105
Art Galleries: Hartley's 'Mt. Katahdin, Autumn, No. 1' P-23*a*, *color picture* P-23*a*
Nebraska City, Neb., city on Missouri River 40 mi. s. of Omaha; pop. 6872; in rich agricultural region; clothing, cigars, canned fruits, vegetables: *map* N-103
early fur post N-106
Nebraska ice sheet I-5
Nebraska State Teachers College, at Chadron, Neb.; state control; founded 1911; liberal arts, education.
Nebraska State Teachers College, at Kearney, Neb.; state control; founded 1905; arts and sciences, education, vocational home economics; summer graduate school.
Nebraska State Teachers College, at Peru, Neb.; state control; founded 1867; liberal arts, education.
Nebraska State Teachers College, at Wayne, Neb.; state control; founded 1889; arts and sciences, education, fine arts, music.
Nebraska Wesleyan University, at Lincoln, Neb.; Methodist; chartered 1887: arts and sciences.
Nebuchadnezzar (*nĕb-ū-kăd-nĕz'ẽr*), or Nebuchadrezzar, Babylonian king from 604 to 561 B.C. B-5, B-9
builds canal C-108*a*
captures Jerusalem J-353
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Nebula (*nĕb'yu-lạ*), in astronomy N-106–7, *picture* N-107
Andromeda, a galaxy, *charts* S-378–9, *picture* N-107
extragal'actic A-443
Orion N-106, *chart* S-373
Neb'ular hypoth'esis, theory that solar system condensed from a nebula P-285, E-177, N-107
moon M-388
Necator, genus of nematode worms to which hookworm belongs.
Nech'bet, a vulture-goddess worshiped in ancient Egypt.
Neches (*nĕch'ĕz*) **River,** in Texas, rises in n.e. and flows 350 mi. s. to Sabine Lake, *map* T-78
Necho (*nē'kō*) **II** (died 593 B.C.), king of Egypt 609–593 B.C.; said by Herodotus to have attempted to complete a canal from Nile River to Red Sea and to have sent a Phoenician ship which circumnavigated Africa.
Neck, in anatomy
cervical nerves, *picture* N-113
muscles, *color pictures* P-239–40
Neckam, also **Neckham, Alexander** (1157–1217), English scholar, lecturer at University of Paris, schoolmaster at Dunstable, later abbot of Cirencester; wrote scientific treatises ('De Naturis Rerum' and 'De Utensilibus'); the latter contains first European mention of mariner's magnetic needle.
Neck'ar River, Germany, tributary of Rhine rising in Black Forest; enters main stream at Mannheim B-203
Heidelberg on H-329
Necker (*nĕk'ẽr*, French *nĕ-kĕr'*), Jacques (1732–1804), French financier and statesman, also writer, born Geneva, Switzerland; father of Mme. de Staël; director general of French finances under Louis XVI: F-292
Necklace, jewelry, *color picture* J-347
Nec'romancer, one who claims to have magic power through communion with the dead (from Greek words for "corpse" and "divination") M-36
Necrop'olis, term meaning "city of the dead," applying to cemeteries near ancient cities, particularly to suburb of Alexandria, Egypt, where corpses were embalmed.
Nectar (*nĕk'tẽr*), in Greek mythology, drink of gods. *See also in Index* Ambrosia
Nectar, the sweet liquid found in many flowers
bees turn to honey B-94
bumblebee gathers, *color picture* B-97
Nec'tarine, a variety of peach (*Prunus persica*); smooth, waxy skin and firm, aromatic pulp; grown either from seed or by grafting; cultivated principally in California; has been known for more than 2000 years.
Needham, Mass., town 12 mi. s.w. of Boston, chiefly residential; pop. of township, 16,313; knit goods: *map, inset* M-132
Needle, phonograph P-206, 207, 208
Needle, sewing N-107
Needlefishes, excellent food fishes (*Belonidae*), found in all warm seas; silvery green in color, including the bones; bodies long and powerful; jaws tapered.
Needle gun F-79
Needlepoint lace L-77–8, *picture* L-79
Needles, rock formations in Black Hills, *picture* S-305
Needlework. *See in Index* Embroidery; Quilts; Sewing
Neenah, Wis., city on Fox River, 30 mi. n. of Fond du Lac; pop. 12,437; paper, veneer and doors: *map* W-173
Neerwinden (*nār'vin-dĕn*), Belgium,

village 30 mi. e. of Brussels where French defeated English 1693, and Austrians defeated French 1793; occupied by Germans 1914 and 1940.
Nefretete, Egyptian queen. *See in Index* Nofretete
Nefud Desert, Arabia A-286, *map* A-285
Negative, photographic P-214, 221
Negative bias, negative charge in radio R-37
Negative electricity E-294, 297, E-316–17, A-457–8
battery B-79–80
Negative number, in mathematics A-154–7
Negative pole, of magnet E-303
Negeb (*nĕg'ĕb*), area in Israel P-43, *map* P-45
Negotiable paper, or **negotiable instruments,** notes, bills, contracts, or documents, which can be endorsed and transferred to third party. Common negotiable instruments are checks, bonds, banknotes, bills of exchange, and promissory notes: C-509–10
Negri (*nā'grē*), **Ada** (1870–1945), Italian poet; her poems show great sympathy for the working class ('Tempeste'; 'Maternità'; 'Sorelle').
Negrillo (*nĕ-grĭl'ō*), Pygmy P-444. *See also in Index* Pygmy
Negri Sembilan (*nā'grē sĕm-bĕ-län'*), a Malay state bordering Strait of Malacca; 2580 sq. mi.; pop. 267,668; exports tin. *See also in Index* Malay States, Federated
Negrito (*nĕ-grē'tō*), Pygmy P-444. *See also in Index* Pygmy
Ne'gro N-107. *See also in Index* Slavery
Africa A-40, 43, S-242, *maps* A-35, 39, *pictures* A-39–40, 49, 53, S-243, *color picture* A-38: Bantu C-434–434*c*, A-43, M-442, T-10; Gold Coast G-134*a*; Liberia L-178; Sudan S-441–2; Uganda Protectorate E-199
Central America C-173
East Indies E-204–5
Guiana G-223
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numbers: Africa A-39; United States N-108
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Constitutional amendments assure civil and legal rights U-347–8, 354–5, R-85*a–b*
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foundations and charities F-249, H-296
lynching, decline of L-355
music M-467
slavery S-197
Civil War and Reconstruction. *See in Index* Civil War, American; Reconstruction period
Confederate States of America C-433
Emancipation Proclamation E-336
suffrage S-443
West Indies W-94, 97, *pictures* W-95: Barbados B-54; Haiti H-244, 245, 246; Jamaica J-292
Negroid race, or **black race** R-21–2, 23, *graph* R-22, *Reference-Outline* R-23–4
hair H-243
numbers P-373
racial classification, *chart* R-22
Negro minstrel, theatrical performance D-141
Negro Mountains (Mount Davis), highest point in Pennsylvania, in Somerset County (3213 ft.): *map* P-132
Negroponte, island of Greece. *See in Index* Evvoia
Negro River. *See in Index* Rio Negro
Negro Rural School Fund, founded 1907 by a bequest of $1,000,000 from Anna Thomas Jeanes for improving elementary education of Negroes in southern states of U.S. *See also in Index* Southern Education Foundation, Inc.
Negros (*nā'grōs*), fourth largest island of Philippines, near center of group; 4903 sq. mi.; pop. 1,218,710: *maps* P-195, P-16
Nehantic. *See in Index* Niantic
Nehemiah (*nē-hĕ-mī'ą*) (5th century B.C.), governor of Judea under Artaxerxes; restored walls of Jerusalem, relieved condition of poor, and re-established temple service: J-353
Nehemiah, Book of, book of the Old Testament largely written by Nehemiah; recounts the events of his rule.
Nehru (*nā'rų*), **Jawaharlal** (born 1889), Indian nationalist leader, prime minister of India N-109, I-68*a, b, picture* N-109
Neighborhood Guild, New York City S-218*a*
Neighborhood playground P-86*c*
Neihardt, John Gneisenau (born 1881), poet, born Sharpsburg, Ill.; appointed poet laureate of Nebraska 1921; lived among Omaha Indians, studying them and their folklore; wrote of American pioneer life ('A Cycle of the West', 5-part epic including 'The Song of Hugh Glass' and 'The Song of Three Friends').
Neil Boxing Trophy, awarded to outstanding boxer of the year. Originated 1938 by Boxing Writers' Association to honor Edward J. Neil, reporter killed in Spanish Civil War.
Neilson, (Lilian) Adelaide, real name Elizabeth Ann Brown (1848–80), English actress famed in both America and England for Shakespearean roles.
Nejd (*nĕǧd*), the larger part of Kingdom of Saudi Arabia; formerly part of dual state of Hejaz and Nejd; chief cities Riyadh and Hofuf; pop. about 4,000,000: A-284, *map* A-285
Ibn Saud's rule A-290
Nekrasov (*nyĕ-krä'sôf*), **Nikolai Alexeijevich** (1821–77), Russian poet; beloved by common people whose daily lives he described; published, at different times, two radical periodicals ('Peasants' Children', 'Last Songs'); long poem 'To Whom Is Life in Russia Worth Living?'
Nek'ton, form of marine life O-332
Nell, Little, sweet unselfish child-heroine of Charles Dickens' 'Old Curiosity Shop', who dies from weariness and privation.
Nelligan (*nĕl-ē-ǧän'*), **Emile** (1882–1942), French-Canadian poet, born Montreal, Quebec C-106
Nelson, Horatio, Viscount Nelson (1758–1805), English admiral N-109–10, *picture* N-109
Copenhagen, battle of N-109, B-37
monument, *map* L-301, *pictures* L-299, I-229
Nile, battle of N-109
tomb in St. Paul's L-301
Trafalgar, battle of N-109–10, N-91
Nelson, Knute (1843–1923), American statesman, born Evanger, Norway; came to U. S. with mother in 1849; with Wisconsin regiment in Civil War; moved to Minnesota 1871; congressman 1882–88; governor 1892–95; U. S. senator 1895–1923; liberal Republican; was author of bankruptcy act (1898) and act creating Department of Commerce and Labor (1902); called "grand old man of Minnesota."
Nelson, Thomas (1738–89), signer of Declaration of Independence; born Yorktown, Va.; governor of Virginia (1781); gave fortune for equipping troops during Revolutionary War and for other public expenses
signature reproduced D-37
Nelson, William Rockhill (1841–1915), journalist, born Fort Wayne, Ind.; founder (with S. E. Morss) of *Kansas City Star,* which under his editorial policy ("independent, but never neutral") exerted considerable influence; left greater part of his wealth for erection of art museum in Kansas City
museum, *picture* U-331
Nelson, British Columbia, Canada, city in s.e. on arm of Kootenay Lake; pop. 6772; center of the mining, lumbering, and fruit-growing Kootenay district: *maps* C-68, 80
Nelson Monument, London, England, *map* L-301, *picture* L-299
Nelson River, Canada, outlet of Lake Winnipeg in Manitoba; flows 400 mi. n.e. to Hudson Bay; including headstreams, Saskatchewan and Bow, its length is 1600 mi.: *maps* C-68, 81
Nelumbo. *See in Index* American lotus
Neman (*nyĕ'mąn*) **River,** Polish **Niemen** (*nyĕ'mĕn*), German **Memel** (*mā'mĕl*), Lithuanian **Nemunas** (*nā'mų-nās*), about 600 mi. long, rises in w. Russia s. of Minsk, flows generally w. to Grodno, turns n. into Lithuania, then flows w. into Baltic Sea s. of Memel (Klaipeda): *map* R-266–7
scene of Peace of Tilsit N-10
Nemathelminthes (*nĕm-ą-thĕl-mĭn'thēz*), a phylum of invertebrate animals, comprising the nematoda.
Nemato'da, class of unsegmented worms of phylum Nemathelminthes; also called a phylum: W-303–4, *Reference-Outline* Z-364, *table* W-303
Nemean (*nē-mē'ăn*) **Games,** ancient Greek athletic and musical festivals held in valley of Argolis in midsummer every two years in honor of Nemean Zeus; the games originated in 516 B.C.
Nemean lion, in Greek mythology, monster slain by Hercules H-342
Nemertea (*nē-mûr'tē-ą*), a phylum of aquatic worms W-302–3, *Reference-Outline* Z-364, *table* W-303
Nemesia (*nē-mē'shĭ-ą*), a genus of annual and perennial African plants, of the figwort family. Low, erect, with narrow, toothed leaves; flowers snapdragon-shaped and orchidlike in beauty, ranging from white through purple with contrasting shades in throat of blossom.
Nemesis (*nĕm'ē-sĭs*), Greek goddess; name means "one who deals out," hence one who distributes good or bad fortune according to man's deserts and punishes violations or any arrogance or presumption; later thought of only as the angry avenger of crime, relentlessly pursuing the evildoer.
Nemi (*nā'mē*), **Lake,** Italy, in Alban Mountains, 18 mi. s.e. of Rome, in crater of extinct volcano; in ancient times called "Mirror of Diana" and famous for beauty and for temple of Diana on its shores. Two pleasure barges built by Emperor Caligula were uncovered in 1928–30 when the lake level was lowered; village of Nemi on height overlooking lake
watchtower in village of Nemi, *picture* I-278

Ne'mo, Captain, the central character of the novel 'Twenty Thousand Leagues under the Sea', by Jules Verne.

Nemophila (*nē-mŏf'i-lą*), a genus of dwarf spreading annual plants of the waterleaf family (*Hydrophyllaceae*) with delicate white or purple spotted blue flowers; among the species cultivated as garden plants are the five-spot (*Nemophila maculata*), baby blue-eyes (*Nemophila menziesii*), and the climbing nemophila or fiesta flower (*Nemophila aurita*).

Nemunas River, in White Russian S.S.R. and Lithuania. *See in Index* Neman River

Nen'nius (flourished 796), Welsh monk and historian, lived in Mercia 'Historia Britonum' A-394

Neoclassicism, in art
painting P-38
sculpture S-79

Neodym'ium, chemical element, *tables* P-151, C-214

Neolite R-241

Neolith, man-made implement of New Stone Age S-401, *picture* S-401

Neolith'ic Age, or **New Stone Age** M-69, S-401, C-325, *pictures* E-357, M-65, 66, S-401, *color picture* M-68
Britain E-357

Neomy'cin, an antibiotic derived from soil mold; discovered by Dr. Selman A. Waksman: B-14

Ne'on, an inert, rare gaseous element, forming one-thousandth of one per cent of air; obtained by distilling liquid air: *tables* P-151, C-214
atomic structure A-460
chemical inertness C-213, *diagram* I-205
electric signs and lights E-314: glow, how produced E-318
electronic structure, *diagrams* C-213, A-458

Neon tetra, tropical fish A-281

Neo-Pla'tonism, a revival of Platonic philosophy, mixed with the pantheistic religion of the Orient; originated in Alexandria, Egypt, in the 3d century.

Neoprene, a rubberlike material R-244

Neoptolemus (*nē-ŏp-tŏl'ē-mŭs*), in Greek mythology, son of Achilles; entered Troy in the wooden horse; slew Priam, king of Troy; also called Pyrrhus.

Neo'sho River, in Kansas and Oklahoma (in n.e. Oklahoma called Grand River); flows 350 mi. to the Arkansas: *maps* K-4, 11, O-371
dam, *picture* O-374

Neotrop'ical region, one of the six zoogeographical divisions of the world Z-361

NEP (New Economic Policy), in Russia R-289–90

Nepal (*nē-pôl'*), country between n.e. India and Tibet; 54,000 sq. mi.; pop. 6,910,000; cap. Katmandu: N-110, *maps* I-54, A-407
flag F-137, *color picture* F-135
Mount Everest E-450
Mount Kanchenjunga, *picture* I-53
relationships in continent, *maps* A-406–7, 411–12

Nepen'thes, or **nepenthe,** mythical Egyptian drug producing forgetfulness of pain and trouble; referred to in the 'Odyssey'.

Nepenthes, pitcher-plant genus P-274

Nepeta, a genus of plants of mint family, includes the catnip and ground ivy.

Neph'oscope, instrument used in weather reporting to determine the direction, velocity, and angular elevation of clouds.

Neph'rite, a somewhat common variety of jade, occurring in Turkestan, New Zealand, Siberia, and Alaska; colors range from white to dark green: J-349

Nepos (*nē'pŏs*), **Cornelius** (99?–24 B.C.), Roman historian ('De viris illustribus').

Nep'otism (from *nepos,* Latin for "nephew"), practice of rulers or state executives who give official positions to relatives.

Nep'tune, in Roman mythology, sea-god corresponding to Greek Poseidon P-381. *See also in Index* Poseidon

Neptune, planet P-282, 285, N-110, *diagrams* P-282–3, *picture* P-285, *table* P-283
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Neptunium, chemical element, *tables* P-151, C-214
in atomic power A-466, *diagram* A-465
radioactivity R-54

Nerbudda River, India. *See in Index* Narbada River

Nereids (*nē'rē-idz*), in Greek mythology, sea nymphs N-318
Calypso O-344
Poseidon attended by P-381
Thetis, mother of Achilles A-8, 9

Nereus (*nē'rē-ŭs*), in Greek mythology, a minor sea god, father of the Nereids; sometimes called "the old man of the sea"; after changing his form in turn to fire, lion, water, and smoke in effort to escape from Hercules, he guided him to the Garden of the Hesperides.

Nernst (*nêrnst*), **Walter** (1864–1941), German physical chemist; professor physics Göttingen University and University of Berlin, director Chemical Institute, Berlin; invented Nernst incandescent lamp in 1897; won Nobel prize in physics, 1920.

Ne'ro (A.D. 37–68), Roman emperor N-110
persecutes Christians N-110
poisons guests with mushrooms M-455
removes statues from Delphi D-62

Ner'oli oil, in perfume making P-148

Ner'va (A.D. 30?–98), Roman emperor (A.D. 96–98); poetic and kindly; liberal and just administrator; adopted Trajan as successor.

Nerve blocking, a mode of producing anesthesia A-247

Nerves N-110–13, *pictures* N-111–13
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autonomic nerves N-110, 111
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diseased and damaged N-113
fibers N-110–11, *picture* N-113: nerve impulse and the synapse N-111–13, *picture* N-111
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narcotics and N-13
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nervousness not caused by N-113
nervous systems. *See in Index* Nervous system
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vitamin B_1 protects V-494

Ner'vo, Amado (1870–1919), Mexican poet L-115, 128

Nervousness
not caused by nerves N-113

Nervous system, in anatomy, the complete system of nerve cells and nerve fibers
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central N-110, 111, 112, 113, *pictures* N-111–13
peripheral (outer) N-110, *picture* N-111
spinal cord B-279, 280, *pictures* B-279, 281: reflexes B-279

Nervures, veins or ribs in the wings of insects.

Ness, Loch, lake in Scotland; 23 mi. long, average width one mile; discharges into Moray Firth by River Ness, 8 mi. long: *maps* B-321, 324

Nes'sus, in Greek and Roman mythology, centaur slain by Hercules H-343

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rabbit R-15, *picture* N-56
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Nes'tor (1056?–1114?), monk of Kiev, Russia; reputed author of the 'Chronicle', the first national history of Russia
quoted R-284

Nestor, in the 'Iliad', an aged king, renowned for his wisdom, eloquence, justice, and knowledge of warfare; when ruling over the third generation of his people, he sailed with other Greeks against Troy and returned safely home (the "Nestor" of an organization or group means "the oldest member"): T-190–1

Nesto'rians, Christian sect named after Nestorius (died about 440), patriarch of Constantinople; centered in Persia; catholicus, or chief bishop, had seat at Baghdad from 762 to 1258; in 6th and 7th centuries spread over much of Asia, evangelizing India and China; there are still a number of adherents in Turkey and Iran.

Netherlands (Holland), kingdom in n.w. Europe; 13,000 sq. mi.; pop. 9,625,499; cap. Amsterdam: N-114–23, H-407, *maps* B-111, E-416, 424, *pictures* N-114–22, *Reference-Outline* N-123
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Haarlem H-239, *picture* H-239
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dikes and canals I-253, N-116, 117, *pictures* N-114, 115, 118
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education N-120: illiteracy P-374
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Admiral Robert Blake B-205
Pilgrims in M-145
American Colonies A-191: Connecticut C-449; Delaware D-48, 56, 59, 60; New Amsterdam, life in N-213, A-198–202, *pictures* A-198–202; New Jersey N-167; Pennsylvania P-138
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Louis Bonaparte, king B-225
loses colonies in South Africa S-244
gains Sumatra S-449
Congress of Vienna and union with Belgium N-121
Scheldt River controversy S-56
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World War II N-114, 122, W-250. *See also in Index* World War II, chronology
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Netherlands Antilles. *See in Index* Netherlands West Indies
Netherlands Borneo. *See in Index* Borneo, Indonesian
Netherlands Indies, or Dutch East Indies. *See in Index* Indonesia, Republic of
Netherlands-Indonesian Union E-209
Netherlands New Guinea. *See in Index* Dutch New Guinea
Netherlands West Indies, officially Netherlands Antilles, formerly Curaçao, Dutch overseas territory made up of two island groups about 550 miles apart; total area 403 sq. mi.; pop. 154,194; one group, just n. of Venezuela, includes Aruba, Curaçao, and Bonaire; the other group, at n.w. end of Leeward Islands, includes Saba, St. Eustatius, and the s. portion of St. Martin; huge oil refineries on Curaçao and Aruba; territorial cap. Willemstad, on Curaçao; in 1954, the territory was given complete internal autonomy: *maps* W-96*a*, V-442, S-252. *See also in Index* Aruba; Bonaire; Curaçao; Saba; St. Eustatius; St. Martin
Nethersole, Olga (1870–1951), English actress; emotional roles—Sappho, Camille, and Paula Tanqueray—in France, America, Australia.
Néthou, Pic de, Spain. *See in Index* Aneto, Pico de
Net price system, in bookselling B-248–9
Nets, fish F-113, *pictures* F-112, W-47
deep sea, *picture* O-331
Netsuke (*nĕt'sụ-kā* or *nā'tsụ-kā*), Japanese carving J-314
Netted melon, or nutmeg melon M-168
Netting, in fabric making F-8
Nettle, a plant of the nettle family, although name is often applied to any plant with stinging hairs.
Nettle family, or Urticaceae (*ûr-tĭ-kā'sē-ē*) (from Latin word, to burn), family of plants, shrubs, and trees some of which have stinging hairs. These hairs are sharp-pointed tubes containing formic acid; they break off in the skin and cause irritation and welts. Family includes members of genus *Parietaria*, source of niter used in drugs; also genus *Boehmeria*, source of China grass, or ramie, used in making textiles.
Nettle tree. *See in Index* Hackberry
Net tonnage, of ships S-162
Networks, broadcasting R-48, 50
Net worth, in accounting B-229, 230
Neuchâtel (*nû-shā-tĕl'*), city in w. Switzerland on Lake Neuchâtel; pop. 27,998; watches and clocks; university: *maps* S-475, E-425
Neuchâtel, lake in w. Switzerland, 18 mi. n. of Lake Geneva; 93 sq. mi.; traversed by river Thièle: *map* S-475
lake dwellers, *color picture* M-68
Neuilly (*nû-yĕ'*), or Neuilly-sur-Seine (*sür-sĕn*), France, manufacturing and residential town, suburb of Paris, on Seine River; pop. 58,658.
Neuilly, Treaty of (1919), between Allied Powers and Bulgaria, signed at Neuilly, France, by which Bulgaria lost its conquests of Balkan War (1912–13) and of World War I to Rumania, Yugoslavia, and Greece: W-240
Neukölln (*noi'kŭln'*), Germany, a section of s. Berlin.
Neumann (*noi'măn*), Alfred (1895–1952), German writer, best known for historical novels and plays ('The Devil', 'The Rebels', 'Six of Them', novels; 'The Patriot', a play).
Neumann, John N. (1811–60), Roman Catholic prelate, born Prachatitz, Bohemia; missionary worker in w. New York (1836–40), as far west as Ohio (1842–44); appointed vice-provincial of Redemptorist order 1847; bishop of Philadelphia 1852.
Neume (*nūm*), in musical notation M-468
Neurath (*noi'rät*), Otto (1882–1945), Austrian social scientist, born in Vienna; originator of an international picture language of symbols called "isotypes" ('Basic by Isotype'; editor 'International Encyclopedia of Unified Science').
Neurilemma (*nū-ri-lĕm'ạ*), of nerve fiber, *picture* N-111
Neuritis, inflammation of nerves N-113
Neurology, science of the nerves and their diseases.
Neuron, also neurone, nerve cells N-110–12, *pictures* N-111, 112
Neurop'tera, an order of four-winged insects I-160*a*
Neurosis N-113
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Neusatz, Yugoslavia. *See in Index* Novi Sad
Neuschwanstein (*noi-shvän'shtīn*) Castle, in Bavaria, *picture* G-95
Neuse (*nūs*), a river of North Carolina, 300 mi. long, *maps* N-268, 275
Neutra, Richard J. (born 1892), American architect, born Vienna, Austria; to U.S. 1925; advocate of functionalism; housing, city planning; ('Survival Through Design').
Neutral colors C-392, 394–5
Neutral equilibrium M-160, *picture* M-160. *See also in Index* Equilibrium, in physics
Neutral ground, Gibraltar G-108
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Neuve-Chapelle (*nûv-shă-pĕl'*), French village, 25 mi. s. of Ypres; in battle March 10–12, 1915, British advanced a few miles at terrific cost.
Nevada (*nĕ-văd'ạ*), state in w. U. S.; 110,540 sq. mi.; pop. 160,083; cap. Carson City: N-124–34, *maps* N-132–3, 126, 129, U-252, 303, *pictures* N-124–6, 130–1, 134
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Nevada, University of, at Reno, Nev.; state control; founded at Elko 1874; opened at Reno 1886; arts and sciences, agriculture, civil, electrical, and mechanical engineering, home economics, mining, normal school; graduate studies: *picture* N-125
Ne'va River, in n.w. Russia; flows 40 mi. from Lake Ladoga to Gulf of Finland; connected by canal with Volga system: L-84
Leningrad on L-162, 163, 164
Nevers (*nē-vĕr'*), France, manufacturing town 140 mi. s.e. of Paris; pop. 32,246; cathedral: *maps* F-270, E-425
Neville (*nĕv'il*), great English family: famous member was Warwick, called "the Kingmaker" (Richard Neville). *See also in Index* Warwick
Neville, Wendell Cushing (1870–1930), U.S. Marine officer, born Portsmouth, Va.; served in Spanish-American War, in Boxer Campaign in China, at Vera Cruz, Mexico, and in the Philippines; commanded 4th brigade of the 2d division in France in World War I; rose to rank of major general 1920; commandant Marine Corps 1929–30.
Nevin (*nĕv'in*), **Arthur Finley** (1871–1943), composer, brother of Ethelbert Nevin; lived for time among Blackfeet Indians and used Indian themes in his music ('Pola'; 'The Daughter of the Forest'; 'Lorna Doone').
Nevin, Ethelbert Woodbridge (1862–1901), composer, born Edgeworth, Pa.; studied in Germany; his piano pieces and songs, many of them lyrical and sentimental, achieved great popularity ('Narcissus'; 'The Rosary'; 'A Day in Venice'; 'Barchetta'; 'The Quest').
Nevins, Allan (born 1890), educator and writer, born Camp Point, Ill.; on editorial staff *The Nation* 1913–18, *New York Evening Post* 1913–23, and *World* 1925–31; professor of American history Columbia University after 1931; Pulitzer prize 1933 for biography of Grover Cleveland and 1937 for biography of Hamilton Fish; author of 'Ordeal of the Union' and other histories.
Nev'is, island of British West Indies, one of Leeward Islands; 50 sq. mi.; pop. 11,388; birthplace of Alexander Hamilton: *map* W-96*a*
Nevis, Ben, peak in Scotland. *See in Index* Ben Nevis
New, Harry S. (1858–1937), U. S. postmaster general 1923–29, former newspaper man; born Indianapolis, Ind.; U. S. senator 1917–23; on Republican National Committee 1900–1912.
New Albany, Ind., industrial and trade city nearly opposite Louisville, Ky., on Ohio River; pop. 29,346; extensive water power; furniture, stoves; national cemetery: *maps* I-79, U-253
New Amsterdam, name of New York City under Dutch rule N-213, N-225, A-198–202, *pictures* A-198–202
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Stuyvesant governor S-434
Newark (*nū'ĕrk*), Del., town 12 mi. s.w. of Wilmington; pop. 6731: D-58, *map* D-53
Newark, or Newark-on-Trent, England, old town 65 mi. s.e. of Manchester; pop. 22,909; gave name to Newark, N. J.: *map* B-325
Newark, N. J., largest city of state; pop. 438,776: N-135, 158, *maps* U-253, *inset* N-164, *pictures* N-135
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first thread mill in U.S. T-124
Newark Public Library: reference desk, *picture* R-88*b*
school library, *picture* L-195
Newark, N.Y., village 26 mi. s.e. of Rochester; pop. 10,295; paper cartons, furniture; fruit and vegetable canning; nursery stock; annual rose festival; state institution for feeble-minded: *map* N-204
Newark, Ohio, industrial city 30 mi. e. of Columbus, on Licking River; pop. 34,275; railroad repair shops and oil refineries; stoves, glass products, lighting fixtures, tires; Buckeye Lake nearby: *map* O-356
Newark College of Engineering, at Newark, N.J.; founded 1881; state and city control; chemical, civil, electrical, and mechanical engineering; graduate studies.
New Bahama Channel. *See in Index* Florida Straits
New Bedford, Mass., manufacturing city on Buzzards Bay; pop. 109,189: N-136, *maps* M-133, U-253, *picture* N-136
New Bern, N. C., port on Neuse River, near its mouth; pop. 15,812; poultry and hog raising; lumber, cotton oil; captured by General Burnside 1862: *maps* N-275, U-253
settlement N-278
Newberry, Clare Turlay (born 1903), artist and writer, born Enterprise, Ore.; famous for paintings of cats; author-illustrator of children's books: 'April's Kittens'; 'Mittens'; 'Smudge'; 'Lambert's Bargain'.
Newberry College, at Newberry, S. C.; United Lutheran; founded 1856; arts and sciences.
Newberry Library, Chicago, Ill.; reference library; general collections in fields of history, literature, philology, music, and genealogy: L-197
Newbery, John (1713–67), English publisher N-136–7, L-269–70
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Newbery award (established by Frederic G. Melcher), for best children's book L-267, 270, N-136. *See also in Index* Awards, *table*
Newbold, Charles, American inventor cast-iron plow A-59
Newbolt, Sir Henry John (1862–1938), English writer; lawyer 1887–99; professor poetry at Oxford University 1911–21; won literary fame with martial ballads 'Admirals All' (1897); knighted 1915 ('The Old Country', novel; 'Drake's Drum and Other Sea Songs'; 'Naval History of the Great War').
New Braunfels, Tex., city 23 mi. n.e. of San Antonio; pop. 12,210; textiles, flour, feed, lime, hosiery, road material; ranching; site of Comal Springs: *map* T-91
New Britain, largest island in Bismarck Archipelago; 14,600 sq. mi.; pop. 85,115; formerly called New Pomerania; mountainous and volcanic: N-143, *maps* E-203, P-16
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New Britain, Conn., manufacturing city 9 mi. s.w. of Hartford; pop. 73,726; hardware; Teachers College of Connecticut: *map* C-444–5
New Brunswick, a maritime province of Canada; 27,985 sq. mi.; pop. 515,697; cap. Fredericton: N-137–8*b*, *maps* C-69, 73, *pictures* N-138–138*b*
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New Brunswick, N. J., manufacturing city on Raritan River 27 mi. s.w. of New York City; pop. 38,811; motor trucks, surgical and medical supplies, cigars and cigar boxes; Rutgers University; occupied by British 1776–77: *map* N-164
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New Brunswick, University of, at Fredericton, New Brunswick, Canada; nonsectarian; founded 1800 (College of New Brunswick, reorganized as university 1859); arts and sciences, civil engineering, electrical engineering, forestry, law.
Newburgh, N. Y., city on Hudson River 55 mi. above New York City; pop. 31,956; important trading and shipping point before Revolution; Hasbrouck Mansion was Washington's headquarters; trade in coal,

fruit, dairy, and farm products; textiles, carpets, foundry and paper products: *maps* U-253, *inset* N-204
Newburyport, Mass., city on Merrimack River 3 mi. from sea and 30 mi. n.e. of Boston; pop. 14,111; shoes, silverware, electrical goods; settled about 1635; famous for shipbuilding in days of wooden sailing vessels; many historic landmarks: *map* M-133
William Lloyd Garrison at G-26
New Caledonia, French **Nouvelle Calédonie** (*nu-vĕl' kā-lā-dō-nē'*), an overseas territory of France, in s.w. Pacific e. of Queensland, Australia; cap. Nouméa; territory consists of island New Caledonia and the following dependencies: Isle of Pines, Loyalty Islands, Chesterfield Islands, Huon Islands, Walpole Island, Belep Islands, Futuna and Alofi islands, and Wallis Islands; area of island New Caledonia, about 6500 sq. mi., pop. 61,250; total area of dependencies, about 900 sq. mi., pop. about 18,000; nickel, chrome; livestock, chiefly cattle; coffee, copra; yams, manioc, taro, corn, bananas: *map* P-16, *picture* P-9
French convicts F-278
nickel N-235
New Caledonia, fur-trading district in w. Canada belonging to Hudson's Bay Company in 19th century; mostly in British Columbia but extended s. of Canadian boundary.
New Castle, the s. part of Castile, Spain, including the old Moorish kingdom of Toledo; chief cities are Madrid, Toledo, Ciudad Real; fertile valleys, sterile plateaus.
Newcastle, Australia, city in New South Wales, 100 mi. n. of Sydney; pop. 127,188 with suburbs; great coaling port; ships wool, coal, mutton: *map* A-489
New Castle, Del., city on Delaware River 5 mi. s. of Wilmington; harbor; pop. 5396; settled by Swedes 1640; landing place of William Penn 1682: D-58, 60, *map* D-53, *picture* D-59
Delaware Memorial Bridge near D-58, *picture* D-54. *See also in Index* Bridge, *table*
New Castle, Ind., town on Blue River 45 mi. n.e. of Indianapolis; pop. 18,271; auto parts, kitchen cabinets; farm trade; roses; state village for epileptics 2 mi. n.: *map* I-78
New Castle, Pa., railroad center 42 mi. n.w. of Pittsburgh; pop. 48,834; on Shenango and Neshannock rivers; important mining and farming region; iron, steel, and tin products, cement, pottery: *maps* P-132, U-253
Newcastle-under-Lyme, England, town 30 mi. s. of Manchester; pop. 70,028; potteries: *map* B-325
Newcastle-upon-Tyne, great coal-shipping center of England, on Tyne River; pop. 291,723: N-138*b*, *maps* B-321, 324
Newchwang, Manchuria. *See in Index* Yingkow
New College, Oxford, England O-434
Newcomb, Simon (1835–1909), American astronomer and mathematician, born Wallace, Nova Scotia, Canada; professor of mathematics U.S. Navy 1861–97; director of U.S. Nautical Almanac (1877–97)
Hall of Fame, *table* H-249
Newcomb College, at New Orleans, La.; founded 1886 by Mrs. Josephine Louise Newcomb as memorial to her daughter, Harriott Sophie Newcomb; for women; arts and sciences, fine arts, music; affiliated with Tulane University.
Newcome, Colonel, in Thackeray's 'The Newcomes' T-109
Newcomen, Thomas (1663–1729), English mechanic; made first practical steam pumping engine: S-390, *diagram* W-75
New Connecticut, first name of Vermont V-462
New Dawn rose, first patented plant P-306
New Deal, legislative plan for economic recovery in U.S. R-204–10, U-388. *See also in Index* Roosevelt, Franklin Delano
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New Delhi (*dĕl'ē*), capital of India; pop. 276,314: D-62, *maps* I-54, A-407
museum. *See in Index* Museums, *table*
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Newdigate Prize, literary award for English verse at Oxford University, England; established by Sir Roger Newdigate (1719–1806), English antiquary: L-267
New Economic Policy (NEP), in Russia R-289–90
Newell, Peter (1862–1924), writer and illustrator of humorous books, especially for children, born McDonough County, Ill.; wrote 'Topsys and Turveys'; 'The Hole Book'; 'The Rocket Book'.
Newel post. *See in Index* Architecture, *table* of terms
New England, collective name for states of Maine, New Hampshire, Vermont, Massachusetts, Connecticut, Rhode Island U-258–63. *map* U-259, *Reference-Outline* U-336. *See also in Index* United States, *subhead* geographic regions; *also* names of states
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New England aster A-426, *color picture* F-176
New England candle pins, a bowling game B-266
New England Colonies. *See in Index* American Colonies, *subhead* New England Colonies
New England Confederation (official name **United Colonies of New England**), formed in 1643, at Boston, by representatives from the colonies of Massachusetts, Plymouth, Connecticut, and New Haven, as a defense against the Dutch and the Indians
John Winthrop leads W-161
New England flag (1775) F-130*c*, *color picture* F-128
'New England Primer', famous schoolbook; written and printed by Benjamin Harris, Boston, about 1688; noted for alphabet rhymes, woodcuts, and child's prayer, "Now I lay me down to sleep:" *picture* E-241
New Farmers of America, national organization for Negro boys studying agriculture in junior and senior high school in those states where there are separate schools; collegiate chapters give training in leadership; founded 1935. Organization similar to Future Farmers of America; 17 states have chapters. Membership more than 38,000. Headquarters, Agricultural Education Branch, Office of Education, U.S., Department of Health, Education, and Welfare, Washington, D.C.: F-326*b*
New Forest, wooded district in s.w. Hampshire, England; administered as national park since 1877; 145 sq. mi.; about one fourth used by private owners and tenants; includes several villages; created royal hunting ground by William I, the Conqueror; New Forest Act, 1949, increased administrative provisions
William II (Rufus) killed in W-138
Newfoundland (*nū'fŭnd-lănd*), island in Gulf of St. Lawrence; 42,734 sq. mi.; pop. 349,915; with Labrador forms Province of Newfoundland, Canada (area 155,364 sq. mi.; pop. 361,416; cap. St. John's): N-139–40, *maps* C-69, 73, N-245, *pictures* N-139–40
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New France, name for Canada under French rule A-190–1, *map* C-69. *See also in Index* Canada, history of; French in America
Newgate, prison in London, England; built about 1200, several times remodeled, and demolished 1902; notorious for wretched moral and sanitary conditions due to crowding and mingling of prisoners.
New Georgia Islands, group in Solomons halfway between Bougainville and Guadalcanal, *map* P-16
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New Glasgow, Nova Scotia, Canada, coal and iron-mining town on East River 80 mi. n.e. of Halifax; pop. 9933; steel, lumber products, ships: *map* C-73
New Goa, Portuguese India. *See in Index* Panjim

New Gottenburg, first permanent settlement in Pennsylvania P-138
New Granada, original Spanish name for Colombia C-388
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New Guinea, largest island of Malay Archipelago; 300,000 sq. mi.; pop., with nearby islands, 2,476,224: N-141–3, *maps* P-16, E-203, *pictures* N-141–2
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New Guinea, Territory of, trusteeship including Northeastern New Guinea, Bismarck Archipelago, and part of Solomon Islands; total area 93,000 sq. mi.; pop. 1,100,258; cap. Port Moresby. Formerly called German New Guinea, became in 1920 an Australian mandate under League of Nations; after World War II, became United Nations trusteeship administered by Australia: N-141, 143, *maps* P-16, E-203
New Hampshire, New England state of U. S.; 9304 sq. mi.; pop. 533,242; cap. Concord: N-143–54, *maps* N-150–1, 144, 147, U-253, 259, *pictures* N-143, 149, 153–4
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New Hampshire, University of, at Durham, N. H.; state control; founded 1866 as New Hampshire College of Agriculture and Mechanic Arts; liberal arts (including education), agriculture, technology: *picture* N-153
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New Hanover, island, Bismarck Archipelago.
New Harmony, Ind., town 22 mi. n.w. of Evansville on Wabash River; pop. 1360; settled 1815 by German Harmonists; property sold 1824 to Robert Owen for socialistic community: S-216, *map* I-79
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New Haven, Conn., city, seat of Yale University; pop. 164,443: N-154, *maps* C-444, U-253
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New Haven and Northampton Canal, *map* C-108
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Newhaven, England, seaport on English Channel at mouth of Ouse River 50 mi. s. of London; pop. 7785; terminus of channel steamer line to Dieppe, France: *map* B-325
New Haven and Northampton Canal, ran from New Haven, Conn., to Northampton, Mass.; completed 1835: *map* C-108
New Haven State Teachers College, at New Haven, Conn.; state control, founded 1893; arts and sciences, education.
New Hebrides, group of islands e. of n. Australia, governed jointly by France and Great Britain; about 5700 sq. mi.; pop. 45,000; coffee, copra, cotton: *map* P-16
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'New Héloïse, The', novel by Rousseau R-236
New Holland, former name of Australia.
New Homemakers of America, national organization for Negro girls and boys studying homemaking in junior and senior high schools in those states having separate schools; founded in 1945; chapters in 16 states. Homemaking teachers and state supervisors of home economics education are advisers. In 1954, organization had 1,236 chapters, with 50,288 members. Headquarters in Home Economics Education Branch, Office of Education, U.S., Department of Health, Education, and Welfare, Washington 25, D.C.
New Iberia, La., city on Bayou Teche, 105 mi. w. of New Orleans; pop. 16,467; seat of Iberia Parish; settled by Spanish and French, some of the latter from Nova Scotia; cane sugar, salt, red pepper: *map* L-330
New imperialism, British B-319
New Ireland, formerly **New Mecklenburg**, 2d largest island of Bismarck Archipelago; 3340 sq. mi.; pop. 33,930; mountainous and volcanic; coconut plantations: N-143, *maps* E-203, P-16
New Jersey, a middle Atlantic state of U.S.; 7836 sq. mi.; pop. 4,835,329; cap. Trenton: N-155–67, *maps* N-164–5, 156, 161, U-253, 265, *pictures* N-155, 157–8, 167
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New Jersey plan, for U. S. Constitution U-342, 343, N-167
New Jersey tea, or redroot, a genus of shrubs (*Ceanothus*) of the buckthorn family having showy clusters of small white, blue, or pink flowers followed by black berries; leaves were used as tea during American Revolution; has dark red root.
New Jersey Turnpike N-157, *pictures* N-155, R-158*b*
Hackensack River and Passaic River bridges. *See in Index* Bridge, *table*
New Jerusalem Church. *See in Index* Swedenborg
New Kensington, Pa., industrial borough 15 mi. n.e. of Pittsburgh on Allegheny River; pop. 25,146; aluminum, steel and iron, and plate glass manufactures: *map* P-132
New Lanark, village in Scotland, 25 mi. s.e. of Glasgow
Robert Owen S-215
Newlands, Francis Griffith (1848–1917), legislator and lawyer, born Natchez, Miss.: U. S. congressman five consecutive terms and U.S. senator from Nevada three terms; author Newlands Act (1913) for mediation in railroad wage disputes.
Newlands Reclamation Project N-124
New Life movement, in China C-229
New London, Conn., port and summer resort on Thames River 40 mi. e. of New Haven; pop. 30,551; printing presses, silk and rayon goods; Connecticut College for Women, founded 1646; burned by British under Benedict Arnold 1781; Harvard-Yale crew races each June: *maps* C-445, U-253
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New Madrid, Mo., city in s.e. on Mississippi River 50 mi. s. of Cairo, Ill.; pop. 2726; agricultural and lumber interests; Confederate post 1861–62: *map* M-319
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Newmarket, England, town 14 mi. n.e. of Cambridge; pop. 10,184; famous for horse races: *map* B-325
New Market, Va., town in Shenandoah Valley, in n. part of state; pop. 701; here, in Civil War battle, May 15, 1864, the Confederates under Breckinridge defeated the Union forces under Sigel: *maps* V-486, C-335
New Mecklenburg, island, Bismarck Archipelago. *See in Index* New Ireland
New Mexico, state of s.w. U. S.; 121,666 sq. mi.; pop. 681,187; cap. Santa Fe: N-168–81, *maps* N-178–9, 171, U-252, 297, N-175, *pictures* N-168–72, 176, 181
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New Mexico, University of, at Albuquerque, N. M.; state control; founded 1889; opened 1892; arts and sciences, business administration, education, engineering, fine arts, inter-American affairs, law, pharmacy; graduate school: *picture* N-171
New Mexico College of Agriculture and Mechanic Arts, at State College, near Las Cruces, N. M.; state control: founded 1889; arts and sciences, agriculture, engineering, home economics; graduate studies.
New Mexico Highlands University, at Las Vegas, N.M.; state control; founded 1893; liberal arts, education; graduate study.
New Mexico Institute of Mining and Technology, at Socorro, N. M.; state control; founded 1889; chemistry, metallurgical, mining, and petroleum engineering, geology, geophysics, mathematics, physics; graduate studies.
New Mexico Military Institute, at Roswell, N. M.; state control; for men; founded 1893; 3-year high school and 4-year college; arts and sciences; Senior Unit, Armor Division of Reserve Officers' Training Corps.
New Mexico Western College, at Silver City, N.M.; state control; founded 1893; liberal arts, education; graduate school in education.
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New Orleans (*ôr'lē-ănz*), La., port on Mississippi River, 115 mi. above its mouth; pop. 570,445: N-182–5, *maps* L-331, U-253, A-531, *inset* L-331, *pictures* N-182–4
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New Philadelphia, Ohio, city with coal-mining and clay-working interests on Tuscarawas River and Ohio Canal about 70 mi. s. of Cleveland; pop. 12,948; stamping and metal-products plants: *map* O-356
New Plymouth, New Zealand, seaport and railroad terminus on w. coast of North Island; pop. 24,923, with suburbs; flour mills, leather manufactures; trade in dairy products: *maps* P-16, *inset* A-489
New Pomerania, island, Bismarck Archipelago. *See in Index* New Britain
Newport, Christopher (1565?–1617), English sea captain, in command of ship which brought Capt. John Smith to America; made several later voyages to Virginia
monument in Richmond, Va. R-153
Newport, England, port in s.w. on Usk River 4 mi. from Bristol Channel; pop. 105,285; coal, iron, cattle trade; iron products: *map* B-325
Newport, Isle of Wight, England, capital and chief market town of island; at head of estuary of Medina River; pop. 20,426; timber, malt, wheat, flour: *map* B-325
Newport, Ky., residential city on Ohio and Licking rivers, opposite Cincinnati, Ohio; pop. 31,044; sheet iron, steel, men's clothing; Fort Thomas, U. S. military post, 2 mi. south: *maps* U-253, *inset* K-31
Newport, R. I., fashionable resort on s.w. coast of island of Rhode Island; pop. 37,564; beautiful estates; much historic interest; U. S. Naval College and torpedo station; founded 1639: R-143, *maps* R-141, U-253, *picture* R-136
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Redwood Library, *picture* L-187
Newport, Vt., city 39 mi. n.w. of St. Johnsbury, on Lake Memphremagog; pop. 5217; farming; wood and maple sugar products; clothing; airport: *map* V-457
Newport Beach, Calif., city 33 mi. s.e. of Los Angeles, on Pacific; pop. 12,120: *map, inset* C-35
Newport News, Va., seaport city and ship-building center on James River at head of Hampton Roads; pop. 42,358; railway terminal. Settled in 1621 by Irish colonists, but development did not begin until completion of railway from Richmond to mouth of James River in 1882 when town was plotted. Four years later a great shipyard (now the Newport News Shipbuilding and Dry Dock Co.) was begun and prosperity followed. Incorporated as city 1896: N-242*b*, C-224, *maps* V-487, U-253
New Providence Island, chief island of the Bahamas; 58 sq. mi.; pop. 29,391; contains only good natural harbor of the group, and Nassau, the capital; settled by English 1629: *map* W-96
New River, rises in Blue Ridge Mts. of North Carolina, flows across w. corner of Virginia and joins Gauley River to form the Kanawha River in Fayette County, W. Va.: *maps* W-106, V-486
New Rochelle, N. Y., residential city and summer resort on Long Island Sound, n. of New York City; pop. 59,725; College of New Rochelle and Iona College; settled 1688 by Huguenots from La Rochelle, France: *map, inset* N-205
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New Rochelle, College of, at New Rochelle, N.Y.; Roman Catholic; for women; founded 1904; arts and sciences.
New Salem, Ill., home of Abraham Lincoln; pop. 184: L-247, I-27
New Salem State Park, in Illinois I-27, *picture* I-28
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Newsboys Foundation, Harry E. Burroughs, Boston, Mass.; estab-

lished 1928 by Harry E. Burroughs to raise cultural level of newsboy.
New Siberian Islands, in Arctic Ocean n. of Siberia; largest Kotelnoi (116 mi. by 100 mi.); uninhabited except for hunters: *maps* R-259, A-406
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New South Wales, Australia, state in s.e.; 309,433 sq. mi.; pop. 2,984,838; cap. Sydney: N-185, *map* A-489, *picture* N-185
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New Thought, a system of idealistic philosophy; in America developed around writings of Ralph Waldo Emerson; affirms control of circumstances by mental power but does not deny existence of matter.
Newton, Sir Isaac (1642–1727), English physicist and mathematician N-193–4, *picture* N-193
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Voltaire spreads Newton's philosophy V-523
Newton, John (1725–1807), English clergyman and poet
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Newton, Iowa, city 30 mi. n.e. of Des Moines in rich agricultural section; pop. 11,723; machinery; steel, iron, and aluminum castings: *maps* I-215, U-253
Newton, Kan., city 25 mi. n. of Wichita; pop. 11,590; farming and stock raising; flour mills, railroad repair shops, creamery; Bethel College (Mennonite): *map* K-11
Newton, Mass., city, a suburb w. of Boston, on Charles River; pop. 81,994; electronic products; Boston College, Andover Newton Theological School, and Newton Junior College: *map, inset* M-132
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New Towne, original name of Cambridge, Mass. C-50
New Ulm, Minn., town on Minnesota River, 75 mi. s.w. of Minneapolis; pop. 9348; farm trade center; settled by Germans; attacked in Sioux uprising of 1862; flour and cereal mills: *map* M-287
New Westminster, British Columbia, Canada, port on Fraser River 12 mi. s.e. of Vancouver; founded 1859; capital of province until 1868; pop. 28,639; lumbering, fishing, fruit and vegetable canning, shipbuilding; exports lumber, lumber products, copper, lead, zinc: *maps* C-68, 80
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New Year's Day, Jewish (Rosh Hashana), festival celebrated on the first or first and second days of Tishri (September or sometimes October)
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New York, a middle Atlantic state of U. S.; 49,576 sq. mi.; pop. 14,830,192; cap. Albany: N-195–214, *maps* N-204–5, 196, 199, U-253, 265, *pictures* N-195, 207–13
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New York, State University of, established 1948 as part of The Univer-

sity of the State of New York; comprised of 11 state teachers colleges, 4 state contract colleges at Cornell University, the college of ceramics at Alfred University, the college of Forestry at Syracuse University, the state maritime college, 6 state agricultural and technical institutes, 5 state institutes of applied arts and sciences, 2 liberal arts colleges, and 2 medical colleges.

New York, The University of the State of, actually department of education of New York State; headquarters, Albany; supervises public schools; licenses members of professions for practice in state; governed by board of regents, which appoints commissioner of education for state of New York.

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New York Botanical Garden, in New York City; established 1896; directed by a private corporation and the city; 235 acres: B-261

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New York University, at New York, N. Y.; established 1831; arts and sciences, commerce, education, engineering, fine arts, law, retailing, medicine, dentistry
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New Zealand, Dominion of, group of British islands in South Pacific Ocean; area 105,416 sq. mi.; pop. 1,939,472; cap. Wellington: N-227–8*b*, *maps* P-16–17, N-228, *inset* A-489, *pictures* N-227, 228*a*–*b*, *Reference-Outline* A-492
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Ngami (*ng-gä'mē*), lake in Bechuanaland Protectorate, Africa; remnant of inland sea; now marshland: *map* A-47

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Niacin. *See in Index* Nicotinic acid

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Niagara Falls, N. Y., resort and industrial city on Niagara River, 20 mi. n.w. of Buffalo; pop. 90,872; Niagara University: N-230, 231–2, *maps* N-204, U-253, *picture-map* N-231
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Rainbow Bridge. *See in Index* Bridge, *table*

Niagara Falls, Ontario, Canada, city opposite Niagara Falls, N. Y., in agricultural and fruit-growing region; pop. 22,874; enormous hydroelectric plants; cereals, batteries, carborundum, hats, silverware; railway center: N-232, *maps* C-69, 72, *picture-map* N-231
Rainbow Bridge. *See in Index* Bridge, *table*

Niagara Falls, one of greatest falls in world N-229–30, *map* U-265, *picture* N-229, *picture-map* N-231
Horseshoe Fall N-230, *picture* N-229, *picture-map* N-231
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size compared with man-made structures, *diagram* D-11*b*
Welland Ship Canal W-90
Whirlpool N-230, W-121, *picture-map* N-231

Niagara Gorge N-230

Niagara of the West, name given to Shoshone Falls in Idaho.

Niagara River, outlet of Lake Erie flowing n. to Lake Ontario, 33 mi.: N-229–30, *map* N-196, *picture-map* N-231

Niagara University, at Niagara Falls, N. Y.; Roman Catholic; for men; founded 1856; arts, sciences, philosophy, business administration.
Niagara Whirlpool W-121, N-230, *picture-map* N-231
Niam-Niam (*nyäm-nyäm'*), **Azandeh**, or **Zandeh**, an important group of tribes of mixed negroid descent in n.e. Belgian Congo and s.w. Sudan; expert agriculturists; formerly a warlike people, skilled in knife throwing; Niam-Niam means "eaters"; they were so called because many were addicted to cannibalism.
Niantic, or **Nehantic**, the name of two distinct Algonquian tribes, one formerly occupying the coast of Rhode Island from Narragansett Bay to about the Connecticut state line, the other the Connecticut coast from Niantic Bay to Connecticut River; former became a part of the Narraganset and latter were absorbed by the Mohegan after the Pequot War of 1637.
Nias (*nē'äs*), island in Indonesia, w. of Sumatra; area 1569 sq. mi.; pop. 187,199: *maps* E-202, A-407, *picture* E-201
"apartment houses," *pictures* E-205
'Nibelungs (*nē'bĕ-lụngs*), **Song of the'**, or **'Nibelungenlied'**, German epic of 13th century N-232, G-83
Siegfried legend S-176–7, S-411
Volsungs. *See in Index* Volsunga Saga; Volsungs
Wagner's operas W-2: stories of O-392–3; musical themes M-464
Nib'lick, an iron golf club, *picture* G-138
Nicaea (*nī-sē'ạ*), or **Nice** (*nīs*) (modern **Isnik**, Turkey), important ancient city of Bithynia, Asia Minor, on Lake Ascania 60 mi. s.e. of Constantinople; declined under Turkish rule (14th century): *map* M-7
council of (A.D. 325) C-302, C-456, E-200
Nicandra (*nī-kăn'drạ*), an annual plant (*N. physalodes*) of the nightshade family, native to Peru; grows to 4 ft.; leaves oval, toothed; flowers blue, 1 in. across, wheel-shaped, solitary; escaped from cultivation in U.S.; also called apple of Peru.
Nicaragua (*nīk-ạ-rä'gwạ*), one of the larger Central American republics; area 57,145 sq. mi.; pop. 1,057,023; cap. Managua: N-232–3, *maps* C-172, N-251. *See also in Index* Central America
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Walker's filibustering expedition P-252
Nicaragua, Lake, largest lake in Central America, in s.w. Nicaragua; drained by San Juan River: N-232, *maps* C-172, N-251
Nicaragua Canal, project N-233, A-392
Nicaraguan Canal Treaty (1884) A-392. *See also in Index* Treaties, *table*
Niccoli (*nēk-kō'lē*), **Niccolo de'** (1363–1437), Italian humanist R-104
Niccolo Pisano. *See in Index* Pisano, Niccolo
Nice, ancient city in Asia Minor. *See in Index* Nicaea
Nice (*nēs*), France, resort on Riviera; pop. 206,750: N-233, *maps* F-259, E-416, 425, *picture* F-265
ceded to France V-468
Ni'cene Creed C-302, C-456
Nicholas (*nīk'ō-lạs*), **Saint** (4th century), bishop of Myra, Asia Minor; in many legends, bountiful patron of children; his feast day (December 6) is near Christmas; hence he comes to be the Christmas gift-bringer, "St. Nick" or "Santa Claus": C-294*b*, S-43*a*, *picture* C-294
Nicholas I, pope 858–867; sometimes called "the Great," one of the most vigorous of the early popes, uncompromising in upholding his claims to universal jurisdiction.
Nicholas II, pope 1059–61; restricted election of popes to College of Cardinals; greatly influenced by Hildebrand (later Gregory VII).
Nicholas III (1216?–80), pope 1277–80; materially strengthened temporal power of the church; man of strict morals and great learning; belonged to house of Orsini.
Nicholas IV, pope 1288–92, first Franciscan monk to become pope; encouraged Crusades and sent missionaries to the East.
Nicholas V (1397–1455), pope 1447–55; founded valuable library and manuscript collection; extended wide patronage to classical scholars of Renaissance.
Nicholas I (1796–1855), emperor of Russia N-233–4, R-286
Nicholas II (1868–1918), emperor of Russia N-234, R-287–8, 289, *picture* N-234
limitation of armaments P-102
William II, correspondence with W-136
Nicholas, or Nikita (1841–1921), hereditary prince of Montenegro; succeeded 1860; assumed title of king 1910; driven into exile by Germans during World War I; deposed 1918 when Montenegro became merged into Yugoslavia; resisted this deposition until his death.
Nicholas, Grand Duke (1856–1929), grandson of Czar Nicholas I; appointed commander in chief of Russian army 1914; later commander in chief in Caucasus; removed from command after Czar's abdication; died in Paris.
Nicholas, Samuel (1744–90), U.S. Marine Corps officer M-97
Nicholas II Land, Russia. *See in Index* Severnaya Zemlya
'Nicholas Nickleby', novel by Charles Dickens in which the evils of cheap schools are disclosed; the hero began his career at Squeers's school.
Nicholas of Pisa. *See in Index* Pisano, Niccolo
Nichols, Robert Malise Bowyer (1893–1944), English poet; wounded in World War I (poetry: 'Under the Yew', 'Aurelia'; drama: 'Wings over Europe', with Maurice Browne).
Nichols, Roy Franklin (born 1896), historian and educator, born Newark, N.J.; professor of history University of Pennsylvania, since 1930; won 1949 Pulitzer prize for 'The Disruption of American Democracy'.
Nichols Field, former U. S. Army airfield on Luzon Island, P. I., 6 mi. from Manila; attacked by Japanese December 1941: *map* P-195
Nicholson, Sir Francis (1655–1728), English colonial official, born near Richmond, England; lieutenant governor or governor of Virginia, Maryland, South Carolina, and Nova Scotia, Canada 1688–1725.
Nicholson, Meredith (1866–1947), novelist and essayist, born Crawfordsville, Ind.; U. S. minister to Paraguay 1933–34, to Venezuela 1935–38, to Nicaragua after 1938 ('The House of a Thousand Candles'; 'The Port of Missing Men'; 'A Hoosier Chronicle').
Nicholson, William (1753–1815), English writer and lecturer; edited *Journal of Natural Philosophy, Chemistry, and the Arts*, earliest work of the kind in England; wrote 'An Introduction to Natural Philosophy'; invented an aerometer and discovered a way of decomposing water by electric current.
Nichrome, an alloy, *table* A-174
Nicias (*nĭsh'i-ạs*) (died 413 B.C.), Athenian statesman and general in Peloponnesian War; became leader of aristocrats on death of Pericles; arranged Peace of Nicias (421 B.C.) between Athens and Sparta, which terminated first decade of Peloponnesian War.
Nickel, a five-cent piece, a coin of the U.S., valued at the twentieth part of a dollar; 75 per cent copper and 25 per cent nickel
Jefferson's portrait on J-332*b*
types collected M-340
Nickel, a metallic element N-234–5, *picture* N-235, *tables* M-176, P-151, C-214
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electroplating E-321
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magnetic nature explained E-304
meteorites contain M-180, 182
plating N-234: replaced by chromium C-300
producing regions N-235, *picture* N-235
silver N-234
steel N-234, A-172
Nickelo'deon, in history of motion pictures, place where "nickel shows" were given; now sometimes applied to automatic pianos and phonographs in public places: M-432
Nicknames N-235
origin of "Yankee" Y-334
states of U.S. *See* Fact Summary with each state article; *see also in Index* name of state, *subhead* name, origin of, and nickname
Nicobar Islands, in Bay of Bengal. *See in Index* Andaman and Nicobar Islands
Nicode'mus, in New Testament, a prominent Pharisee, who visited Jesus by night as an inquirer (John iii); helped to bury Jesus.
Nicolay (*nĭk'ō-lā*), **Helen** (1866–1954), American author, born Paris, France, daughter of John George Nicolay ('The Boy's Life of Ulysses S. Grant'; 'The Book of American Wars'; 'The Boys' Life of Lincoln').
Nicolay, John George (1832–1901), American author, secretary to Lincoln; born Bavaria; joint author with John Hay of 'Abraham Lincoln: A History'.
Nicolet (*nē-kō-lē'*), **Jean** (1598–1642), early French explorer in America (1634–35) W-164, 178, A-191
Upper Peninsula, Mich. M-220, 229
Nic'oll, Sir William Robertson (1851–1923), English man of letters, known as authority on the Brontë family ('Literary Anecdotes of the Nineteenth Century'; 'Life of Ian Maclaren'; 'Life of the Brontës').
Nicolle (*nē-kōl'*), **Charles Jean Henri** (1866–1936), French physician and bacteriologist, born Rouen, France; discovered body louse transmits typhus; won 1928 Nobel prize in medicine and physiology.

Nicollet, Joseph Nicholas (1786–1843), French explorer and mathematician; came to U. S. 1832; official surveyor of upper Mississippi and Missouri rivers (1836–39); made valuable maps and reports.

Nicolls, Sir Richard (1624–72), first English colonial governor of New York; sent to America to organize attack on New Netherland; firm conciliatory executive; won respect of both Dutch and English.

Nicolson, Harold (George) (born 1886), English biographer and diplomat, born Tehran, Iran; husband of Victoria Sackville-West; member of diplomatic service 1909–29; member of Parliament 1935–45; wrote biographies of Tennyson, Byron, Swinburne, and Constant de Rebecque.

Nicomedia (*nĭk-ō-mē'dĭ-ą*), wealthy ancient city on e. arm of Sea of Marmara; capital of Bithynia; Hannibal committed suicide nearby (183 B.C.); Constantine the Great died here (A.D. 337); modern Izmit (also Ismid or Kocaeli) in Turkey; busy seaport; pop. 35,564.

Nicop'olis, also **Nikopol,** Bulgaria, town in n. on Danube River at junction with the Osam; pop. 5409.

Nicopolis, or **Actia Nicopolis,** ancient city of Epirus, in Greece near n.w. coast; now in ruins; founded 31 B.C. by Augustus to commemorate victory over Mark Antony at Actium.

Nicosia (*nī-kō-sē'ą*), capital of island of Cyprus; pop. 34,485; silk, leather, woolens: *maps* T-215, E-417

Nicot (*nē-kō'*), **Jean** (1530–1600), French diplomat; scientific name of tobacco given in his honor: T-143

Nicotia'na, tobacco plant genus T-143

Nic'otine, poisonous alkaloid in tobacco T-144

Nicotinic acid, or **niacin,** a vitamin V-495–6, 498
- cooking, effect of V-496
- in bread B-298

Nictheroy, Brazil. *See in Index* Niteroi

Nidaros, Norway. *See in Index* Trondheim

Niebuhr (*nē'bųr*), **Barthold Georg** (1776–1831), German historian and classical scholar, pioneer in modern historical methods; his 'Roman History' regarded as epoch-making.

Niebuhr, Reinhold (born 1892), theologian, born Wright City, Mo.; widely known for forceful expression of neo-orthodox Protestant views and for his liberal social thought; professor, Union Theological Seminary, New York City 1930–, dean of faculty 1950–55; vice-president after 1955 ('Faith and History'; 'The Irony of American History'; 'Christian Realism and Political Problems').

Niedersachsen, Germany. *See in Index* Lower Saxony

Niehaus (*nē'hous*), **Charles Henry** (1855–1935), sculptor, born Cincinnati, Ohio; work outstanding for simplicity, excellent composition and classical line; did many public memorials (statues of Garfield, McKinley, Dr. Hahnemann, John Paul Jones, Lincoln).

Niello (*nē-ĕl'lō*), or **black work,** in decorating metals E-386

Niel'sen, Alice (1876–1943), dramatic soprano, born Nashville, Tenn.; won first success in comic opera; famous for Mozart roles.

Nielsen, Kay (born 1886), artist and illustrator, born Copenhagen, Denmark; moved to America; work reveals rare imagination; illustrated 'Fairy Tales', by Hans Christian Andersen, and 'East of the Sun and West of the Moon', by Edgar Parin d'Aulaire.

Niemen River, in White Russian S.S.R. and Lithuania. *See in Index* Neman River

Niépce (*nē-ĕps'*), **Joseph Nicéphore** (1765–1833), French physicist, one of inventors of photography P-225

Nierembergia (*nē-rĕm-bĕr'ĵĭ-ą*), or **cupflower,** a genus of dainty perennial plants with many bell-shaped flowers, violet or white. Native to tropical America; also called bluecup and whitecup.

Nietzsche (*nē'chĕ*), **Friedrich Wilhelm** (1844–1900), German philosopher; exalted self-assertion, the "will to power," as the final self-justifying good in life; denounced Christian virtues of pity and humility as "slave morality"; died insane ('Beyond Good and Evil'; 'The Will to Power'; 'Thus Spake Zarathustra'): G-85, *picture* G-84

Nieuwland (*nū'lănd*), **Julius Arthur** (1878–1936), American chemist, Roman Catholic priest, and educator, born Belgium; professor at University of Notre Dame, Notre Dame, Ind.
- discoveries in chemistry of rubber R-244

Nieuwveld (*nyų'vĕlt*) **Mountains,** division of main range in province of Cape of Good Hope, Union of South Africa.

"Nife" zone, in geology G-53

Niflheim (*nĭf'l-hīm*), in Norse myth, land of eternal fog and mist M-476*c*

Nigella (*nī-ĵĕl'ą*), or **fennelflower,** a genus of annual plants of the buttercup family, native to Mediterranean and Turkestan. Grows 1 to 2 ft.; leaves threadlike; flowers with 5 petals, white, blue, or yellow surrounded by collar of leaves; seed capsule a balloon enclosed in net of fine leaves; one species, love-in-a-mist (*N. aamuscena*), also called devil-in-a-bush.

Niger (*nī'ĵĕr,* French *nē-zhĕr'*), territory in French West Africa, n. of Nigeria; includes part of Sahara; acquired by France 1912; approximately 458,000 sq. mi.; pop. 2,041,000; cap. Niamey; livestock; millet, beans, manioc, rice, cotton: *map* A-46

Nigeria (*nī-ĵēr'ĭ-ą*), region in w. Africa on Gulf of Guinea, under British control; area 372,674 sq. mi.; pop. 31,500,000; cap. Lagos: N-235–6*a*, *map* A-46, *pictures* N-236–236*a*
- government N-235, 236*a*
- location, *picture* N-235
- natural features N-236
- people N-236
- relationships in continent, *maps* A-46–7, 41-2, 39, 51

Niger (*nī'ĵĕr*) **River,** 3d largest river of Africa (2600 mi.) N-236*a–b*, *maps* A-46, 41–2
- length, comparative. *See in Index* Rivers, *table*
- location, *picture* N-236*a*

Niggertoe, or **Brazil nut** N-316

Night. *See in Index* Day and night

Night blindness E-460

Night-blooming cereus, a cactus C-10, *picture* H-288*a*

"Night eye" E-460

Nighthawk, a bird of the goatsucker family N-236*b*, *picture* N-236*b*, *color picture* B-182
- food habits B-158, N-236*b*

Night heron H-351, *picture* H-350

Nightingale, Florence (1820–1910), English war nurse N-236*b–7*, *picture* N-236*b*
- Crimean War C-514

Nightingale, a songbird N-237

Nightjar, various large-mouthed insect-eating birds, including nighthawks N-236*b*
- foot, *picture* B-175

Night phlox. *See in Index* Zaluzianskya

Night school, for adults E-255

Nightshade, a plant N-237
- bittersweet nightshade B-201, *picture* P-339

Nightshade, deadly, or **belladonna** N-237, P-341

Nightshade family, or **Solanaceae** (*sōl-ą-nā'sē-ē*), a large group of herbs, rarely shrubs, with small flowers, and alternate leaves; fruit, a capsule or berry; includes potato, tomato, tobacco, eggplant, petunia, as well as many poisonous species. *See also in Index* Nightshade, a *plant*

'Night Watch', by Rembrandt R-103

Nihilists (*nī'hĭl-ĭsts*), Russian revolutionists T-213
- Alexander II assassinated by A-147

Nihon-bashi (Bridge of Japan), Tokyo T-145

Niihau (*nē-ē-hä'ų*), an island of the Hawaiian group; 72 sq. mi.; pop. 222; sheep: H-288*a*, *maps* H-286, P-17

Niitakayama, Formosa. *See in Index* Morrison, Mount

Nijinska, Brontislava (born 1891), Russian ballet dancer and choreographer, born Warsaw, Russia; sister of Vaslav Nijinsky; dancer with Imperial Russian Ballet and Diaghilev's ballet; composed over 200 ballets ('Gypsy Dances'; 'Hundred Kisses'); came to U. S. 1940.

Nijinsky (*nē-ĵĭn'skĭ*), **Vaslav** (1890–1950), brilliant Russian ballet dancer, born Kiev; trained in Russian Imperial Ballet School; made debut 1907; with Diaghilev's Russian Ballet 1909–13; American tour 1916–17; mental breakdown ended career late in 1917; most famous creations 'Specter of the Rose'; 'Les Sylphides'; 'Afternoon of a Faun': *picture* D-14*i*

Nijmegen (*nī'mā-ĵĕn*), also **Nimwegen** (*nĭm'vā-ĵĕn*), Netherlands, industrial center on Waal River; pop. 106,523; ancient Roman camp: *maps* B-111, E-424

Nijmegen, Peace of (1678–79). *See in Index* Treaties, *table*

Nijni Novgorod, Russia. *See in Index* Gorki

Nikaria, ancient Icaria, Greek island in Aegean Sea 130 mi. s.e. of Athens; taken from Turkey after Balkan Wars 1912–13; 83 sq. mi.; produces charcoal, sponges: *map* G-189

Nike (*nī'kē*), in Greek mythology, goddess of victory.

Nike Apteros. *See in Index* Wingless Victory, Temple of

Nike of Samothrace. *See in Index* Winged Victory

Nikisch (*nē'kēsh*), **Arthur** (1855–1922), Hungarian orchestral conductor; noted for interpretations of Wagner; conductor of Boston Symphony Orchestra 1889–93; conductor of famous Leipzig Gewandhaus concerts from 1895 to his death.

Nikita, king of Montenegro. *See in Index* Nicholas

Nikko (*nĭk'kō*), mountainous region, containing town, Nikko, on island of Honshu, Japan, about 75 mi. n. of Tokyo; religious and tourist center; temples, tombs, sanctuaries, and a sacred bridge

national park N-39
three wise monkeys, *picture* M-353
Toshogu Shrine, *picture* J-313
Nikolaev (*nē-kŏ-lä'yĭf*), Russia, grain port on Bug River near Black Sea, 70 mi. n.e. of Odessa; pop. 200,000: *maps* R-267, B-204, E-417
Nikolaevsk (*nē-kŏ-lä'yĕfsk*), seaport in e. Siberia at mouth of the Amur River on Sea of Okhotsk; improved harbor is kept open all year; pop. about 50,000: *map* A-406
Nikopol, Bulgaria. *See in Index* Nicopolis
Nikopol (*nē-kŏ-pôl'*), Russia, town in s. Ukraine on Dnieper River about 45 mi. s.w. of Zaporozhe; pop. 57,841; manganese: U-233, *map* R-267
Nile, battle of (1798) N-109
Nile River, longest river of Africa (3473 mi.) N-237–8, *maps* E-271, P-156, A-41–2, 46, *picture* N-238
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Aswan Dam E-272, *picture* E-278. *See also in Index* Dam, *table*
canal to Red Sea C-108–108*a*
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length, comparative. *See in Index* Rivers, *table*
Ripon Falls, *picture* N-238
source discovered N-238, V-471
water power, first use of W-67
Niles, Mich., city on St. Joseph River 47 mi. s.w. of Kalamazoo in rich farm and fruit country; pop. 13,145; metalwork, paper mills: *map* M-227
Niles, Ohio, manufacturing center on Mahoning River 50 mi. s.e. of Cleveland; pop. 16,773: *map* O-356
Nilgai (*nĭl'gī*), an Indian antelope commonly called "blue bull"; slate gray, with brown markings on face.
Nilgiri (*nĭl'gī-rē*) **Hills**, plateau in s. India in Madras region; some peaks over 8000 ft.
'Nils, The Wonderful Adventures of', story by Selma Lagerlof L-87, S-412
Nilson, Lars Fredrik (1840–99), Swedish chemist, discoverer of scandium.
Nimble fly, name for certain long-legged bristly flies of family *Tachinidae*, remarkable for rapid movements; larvae inhabit and kill caterpillars, beetles, snails: F-189
Nimbus, a cloud C-359
Nimbus, in art, the halo or disk of light surrounding head of a sacred personage.
Nimes (*nēm*), city in s. France 60 mi. n.w. of Marseilles; pop. 75,398; silk trade and manufactures: wine and brandy market: *maps* F-259, E-425
aqueduct A-283
Roman ruins F-264, *picture* F-271
Nimitz, Chester W. (born 1885), U.S. Navy officer N-238, *pictures* N-238, R-213
Nim'rod, in Genesis x, 8–9, a mighty hunter and founder of the Babylonian and Assyrian empires.
Nimrud, Iraq. *See in Index* Kalah
Nimwegen, Netherlands. *See in Index* Nijmegen
'Nina' (*nēn'yä*), one of the three ships of Columbus on his first voyage to America C-418, 418*b*
Ninebark, shrubs (*Opulaster* or *Physocarpus*) of the rose family with lobed heart-shaped leaves and white or pink flower clusters which resemble spirea; bark becomes loose and shredded when old, separating into many thin layers; fruit, red pods; often cultivated.
Ninepins, game B-266
Nine-Power Treaty J-321, H-267
Ninety-five theses, of Luther L-353
Nineveh (*nĭn'ē-vē*), capital of ancient Assyria on the Tigris River N-239, B-9, *maps* B-6, A-285
library L-181
Nine Worthies, The, heroes popular in medieval art and stories: three Christians—King Arthur, Charlemagne, Godfrey of Bouillon; three Jews—Joshua, David, Judas Maccabaeus; three paynims (or pagans)—Hector of Troy, Alexander the Great, Julius Caesar.
Ningpo (*nĭng-pō'*), China, city 80 mi. s. of Shanghai on Ningpo River; pop. 249,633; commerce in tea, silk, cotton, carpets, fish; became treaty port 1842: *maps* C-260, A-406
Ningsia (*nĭng'shĭ-ä'*), province of w. Inner Mongolia, now included in Northwest Administrative Area of Chinese People's Republic; cap. Yinchwan (Ningsia); grasslands of extensive dry areas are used for nomadic grazing; kaoliang, wheat, beans, vegetables, and fruit are grown in irrigated districts along Hwang Ho (Yellow River): M-342
Ninon (*nē-nôn'*), sometimes called **triple voile**, a sheer, closely woven voile made of rayon or silk; used for dresses and glass curtains.
Ninus (*nī'nŭs*), legendary founder of ancient Assyrian city of Nineveh.
Nio (*nī-ō'*), modern name of ancient Ios, Greek island, one of Cyclades in Aegean Sea, 13 mi. s. of Naxos; about 45 sq. mi.; according to tradition Homer is buried there.
Niobe (*nī'ō-bē*), in mythology N-239
Nio'bium, formerly **colum'bium**, a rare metallic element of silvery color, high melting point, and high resistance to acids; somewhat similar to tantalum; vital component in stainless steel and other alloy steels: *tables* P-151, C-214
nitride, strips in bolometer I-149
Niobrar'a River, Neb., rises in s.e. part of Wyoming and flows east through n. Nebraska for 450 mi. into Missouri River: *maps* N-95, 102–3, U-286
canyons N-95
Niort (*nē-ôr'*), France, town 32 mi. n.e. of La Rochelle; pop. 29,068; tanning, glovemaking: *map* E-425
Nipa (*nē'pä*) **palm**, native of East Indies and Australia; fruit edible; sugar and alcohol from juice; introduced into s. Florida
Philippine Islands P-196–7
Nip'igon, Lake, in Ontario, Canada, 70 mi. long; discharges by Nipigon River into Lake Superior: *maps* C-69, 72
archaeological finds O-387
Nip'issing, Lake, in Ontario, Canada, between Georgian Bay and Ottawa River; 55 mi. long; link in proposed Georgian Bay Canal: *map* C-72
Nipkow, Paul G. (1860–1940), German scientist; television pioneer: T-54*d*
Nipmuc (*nĭp'mŭk*), the Algonquian Indian tribes of central Massachusetts and extending into Connecticut and Rhode Island. They joined in King Philip's War in 1675 and at its close most of them fled to Canada or joined the Mahican and other tribes on Hudson River.
Nip'pon, native name for Japan; means "land of the rising sun"; Dai Nippon, "Great Nippon."
Nippur (*nĭp-pŏr'*), ancient city of Mesopotamia, 50 mi. s.e. of Babylon; flourished 4000 B.C.; 1952 excavations by universities of Chicago and Pennsylvania found a temple and hundreds of Sumerian tablets: *maps* I-224, B-6
NIRA (National Industrial Recovery Act), U. S. R-206–7, M-360
Nirvana (*nĭr-vä'nạ*) B-339
Nis (*nēsh*), also **Nish**, Yugoslavia, Serbian town 130 mi. s.e. of Belgrade; pop. 60,677; ancient Naissus, birthplace of Constantine the Great; held by Turks 1456–1878: *maps* B-23, E-417
in World War I W-230
Nisei (*nēs'ā'ĭ'*), persons of Japanese ancestry who are citizens of another country. *See also in Index* Issei
Nishapur (*nē-shä-pŭr'*), ancient town in n.e. Iran; pop. 24,270; birthplace of poet Omar Khayyam: *map* I-224
Niska, a Chimmesyan Indian tribe living on Nass River and its tributaries and on Nass Bay, British Columbia, Canada.
Nisqually Glacier, in Mount Rainier National Park N-37
Niter. *See in Index* Saltpeter
Niterói, formerly **Nictheroy** (*nē-tĕ-roi'*), Brazil, capital of state of Rio de Janeiro, across the bay from city of Rio de Janeiro; elegant suburban homes, fine bathing beaches; manufactures include textiles, tobacco, soap; pop. 174,535: *map* B-288
Niton. *See in Index* Radon
Ni'trate, a salt of nitric acid containing nitrate radical (NO_3) N-239, N-240
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Nitric acid N-240. *See also in Index* Nitrate
antidote F-96
aqua regia contains G-134
etching employs E-387
nickel dissolved by N-235
Nitric dioxide, or nitrogen peroxide, a reddish-brown gaseous compound (NO_2) N-240
Nitric oxide, compound of nitrogen and oxygen (NO), a colorless, poisonous gas, discovered (1772) by Joseph Priestley; important in nitrogen fixation: F-317, N-240
Nitrides N-241
Nitriding process, in case hardening of steel I-245
Nitrifying bacteria N-241
Nitriles (*nī'trĭlz*), in chemistry, cyanogen compounds with organic radicals; characterized by univalent group CN; usually liquid compounds with ethereal odor.
Nitrites, salts of nitrous acid (HNO_2) N-239, N-241
Nitrocel'lulose, or cellulose nitrate C-163, *table* C-162
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NOBEL PRIZE WINNERS—UNITED STATES AND CANADA

(For biographical information, *see in Index* names below)

Physics—Albert A. Michelson, 1907; Robert A. Millikan, 1923; Arthur H. Compton (co-winner with Charles T. R. Wilson, England), 1927; Carl D. Anderson (with Victor F. Hess, Austria), 1936; Clinton J. Davisson (with Sir George P. Thomson, England), 1937; Ernest O. Lawrence, 1939; Otto Stern, 1943; Isidor Isaac Rabi, 1944; Percy W. Bridgman, 1946; Edward Mills Purcell and Felix Block, co-winners, 1952.

Chemistry—Theodore W. Richards, 1914; Irving Langmuir, 1932; Harold C. Urey, 1934; James B. Sumner, John H. Northrop, and Wendell M. Stanley, co-winners, 1946; William F. Giauque, 1949; Edwin Mattison McMillan and Glenn T. Seaborg, co-winners, 1951; Archer J. P. Martin, Canada (with Richard L. M. Synge, England), co-winners, 1952; Linus C. Pauling, 1954.

Medicine and Physiology—Alexis Carrel, 1912; Sir Frederick G. Banting and John J. R. MacLeod (both of Canada), co-winners, 1923; Karl Landsteiner, 1930; Thomas H. Morgan, 1933; George R. Minot, William P. Murphy, and George H. Whipple, co-winners, 1934; Edward A. Doisy (with Henrik Dam, Denmark), 1943; Joseph Erlanger and Herbert S. Gasser, co-winners, 1944; Hermann J. Muller, 1946; Carl F. and Gerty T. Cori (with Bernardo A. Houssay, Argentina), 1947; Philip S. Hench and Edward C. Kendall (with Tadeusz Reichstein of Switzerland), 1950; Max Theiler, 1951 (resident of United States, but citizen of South Africa); Selman A. Waksman, 1952; Fritz A. Lipmann (with Hans A. Krebs of England), 1953; John F. Enders, Thomas H. Weller, and Frederick C. Robbins, co-winners, 1954.

Literature—Sinclair Lewis, 1930; Eugene O'Neill, 1936; Pearl Buck, 1938; William Faulkner, 1949; Ernest Hemingway, 1954.

Peace—Theodore Roosevelt, 1906; Elihu Root, 1912; Woodrow Wilson, 1919; Charles G. Dawes (with Sir [Joseph] Austen Chamberlain, England), 1925; Frank B. Kellogg, 1929; Jane Addams and Nicholas Murray Butler, co-winners, 1931; Cordell Hull 1945; Emily Greene Balch and John R Mott, co-winners, 1946; American Friends Service Committee, Philadelphia (with Friends Service Council, London, England), 1947; Ralph Bunche, 1950; George C. Marshall, 1953.

NOTE.—*Unless indicated otherwise, all winners shown above were citizens of the United States at the time of the award. Not listed above are Albert Einstein (physics, 1921) and Thomas Mann (literature, 1929), who were citizens of Germany at the time of their awards but later became citizens of the United States—Einstein in 1940 and Mann in 1944. T. S. Eliot, American-born poet (literature, 1948), is omitted from the list because he was a British subject when he received his award.*

dex Nitrate; also headings beginning with Nitric and Nitro
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animals need N-240
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explosive compounds E-457–8
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bacterial action N-240, P-297, B-13, S-228–9, *picture* B-14: alfalfa A-151, *picture* A-151; clover C-359, *picture* C-360
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Nitrogen peroxide. *See in Index* Nitric dioxide
Nitroglyc'erin, an explosive D-166, E-457, 458
Nitrous oxide. *See in Index* Laughing gas
Nitti (*nēt'tē*), **Francesco Saverio** (1868–1953), Italian statesman and author; professor economics, University of Naples; minister of agriculture, industry, trade, treasury; as premier distinguished himself in financē; opposed Fascism; left Italy 1924 as exile, returned after World War II ('They Make a Desert').
Niue (*nē-ō'ā*) **Island, or Savage Island**, dependency of New Zealand since 1901; in Pacific e. of Tonga Islands; 100 sq. mi.; pop. 4253; chief town Alofi; copra: *map* P-17
Nivelle, Robert Georges (1856–1924), French World War I general, born Tulle, France; **commander in chief** of French armies 1916–17
Chemin des Dames W-227, A-111
Niven (*niv'ĕn*), **Frederick John** (1878–1944), novelist, born Valparaiso, Chile, of Scottish parents; educated Scotland; lived in Canada after World War I ('Mrs. Barry'; 'Mine Inheritance').
Nivernais (*nē-vêr-nā*), France, historic province, *map* F-270
Nix'ies, water fairies F-11
Nixon, Richard M(ilhous) (born 1913), political leader, born Yorba Linda, Calif.; U.S. Navy officer 1942–46; U.S. congressman from California 1947–51; U.S. senator 1951–53; in House and Senate sponsored measures to combat subversive activity; elected vice-president of U.S. under Dwight D. Eisenhower 1952: E-287*b*, *pictures* E-287*b*, *d–e*
Niza, Marcos de. *See in Index* Marcos
Nizam (*nī-zäm'*), former princely ruler of Hyderabad, India H-455
Nizam, famous diamond, *picture* D-79
Nizhni Novgorod, Russia. *See in Index* Gorki
Nizhni Tagil (*nyĭsh'nyē tà-gĭl'*), industrial city in w.-central Siberia on e. slope of Ural Mts.; gold, platinum, copper, iron; pop. 250,000: *map* R-266, A-406
NKVD, Russian secret police; name made from initials of words meaning People's Commissariat of Internal Affairs: R-282
NLRB (National Labor Relations Board), U. S. L-72, 73
NMRI 448, insecticide I-164
No. *See in Index* No drama
Noah (*nō'ą*), in Genesis vi-ix, builder of the Ark, in which he and his family and one pair of every kind of animal were saved from the Deluge; ancestor of various races through sons, Shem, Ham, Japheth
Mount Ararat A-418
Sumerian legend B-7
Noailles (*nō-ĭ'yŭ*), **Anna-Elisabeth, Comtesse Mathieu de** (1876–1933), French poet, novelist F-289, 290
Nobel (*nō-bĕl'*), **Alfred Bernhard** (1833–96), Swedish chemist, inventor, philanthropist N-242, *picture* N-242
founds Nobel prizes N-242
Nobel prizes N-242, L-267. For names of Nobel prize winners in U. S. and Canada, *see table* on this page
Nobile (*nō'bē-lā*), **Umberto** (born 1885), Italian airship designer, aviator, and Arctic explorer; designed dirigibles *Norge* and *Italia*; dean aeronautics, Lewis Holy Name School of Aeronautics, Lockport, Ill. 1939–42: P-350*a*
Amundsen and A-238–9, *map* P-346
Nobility, titles of. *See in Index* Titles of nobility
Noble fir, evergreen tree (*Abies nobilis*) of pine family, native from Washington to California. Grows 60 ft. to 200 ft. high; has rough red-brown bark, rounded crown. Leaves rounded, gray-green, to 1¼ in. long, with white lines on both sides; cones to 10 in. long. Wood has reddish streaks; sometimes marketed as "white fir" and "larch."
Noble gases, or **inert gases** C-213, A-460, *table* P-151
electronic structure, *diagram* C-213
Noble metals, term sometimes applied to gold and platinum because of their slight tendency to combine with other elements; also to silver, palladium, rhodium, mercury, aluminum, and even copper.
Nocera (*nō-chā'rä*) **Inferiore**, Italy, city 20 mi. s.e. of Naples; pop. 23,289; linen and woolen goods.
Noche Buena (*nō'chā bwā'nä*), Spanish Christmas Eve festival C-295
Nocturne, in music. *See in Index* Music, *table* of musical terms and forms
Noddack, Walter (born 1893) and **Ida** (born 1896), German chemists; with O. Berg, codiscoverers of masurium and rhenium.
Nodding lily. *See in Index* Yellow lily, wild
Noddy tern, bird G-231
Node, in astronomy, the two points where the orbit of a planet intersects the plane of the earth's ecliptic; one is the ascending, the other the descending node
regression of the nodes M-388
No drama, also **Noh drama**, Japanese theatrical performance dating from 14th century; of slow tempo: J-313, D-14*f*
Noël (*nō-ĕl'*), French name for Christmas C-299
Bonhomme Noël C-294*b*
carols, or noëls C-294
Nofretete (*nŏf-rĕ-tē'tē*), or **Nefretete**, Egyptian queen S-76, *pictures* A-298, F-319*c*, *color picture* S-72
Nogales (*nō-gä'lĕs*, Spanish *nō-gä'-*

lās), Ariz., city on Mexican border (pop. 6153), separated by a street from Nogales, Mexico (pop. 24,480); port of entry for w. coast of Mexico; export and import trade; silver, copper, lead, and molybdenum in vicinity, also cattle raising: *maps* A-353, M-189, 194, U-252

Nogi (*nō'gē*), **Ki-Ten Marosuke, Count** (1849–1912), Japanese general, victor of Port Arthur in Russo-Japanese War R-296

Noguchi (*nō-gō'chē*), **Isamu** (born 1904), abstract sculptor, designer of stage sets and modern functional furniture, born Los Angeles, Calif.; son of American mother and famed Japanese poet, Yone Noguchi; contributed bridge designs to Peace Park at Hiroshima
Noguchi table, *picture* F-319

Noh, Japanese drama. *See in Index* No drama

Noise, loud or confused sound
devices for broadcasting R-48, *picture* R-49
distinguished from music S-239
efficiency, effect on W-200

Noko'mis, in Henry Wadsworth Longfellow's poem 'Hiawatha', Hiawatha's grandmother, who taught him the legends of his race.

Nola (*nō'lä*), Italy, city 16 mi. n.e. of Naples; pop. 10,733; prominent in Roman times; Augustus died there A.D. 14.

Nolan, Jeannette Covert (born 1896), author of books for adults and children, born Evansville, Ind.; books for children: 'The Young Douglas', 'Florence Nightingale', 'Story of Clara Barton', 'John Brown'.

Nolan, Philip (died 1801), American filibuster; led unsuccessful expedition into Spanish Texas with Col. Ellis P. Bean in 1800; killed by Spaniards.

Nolan, Philip, hero of E. E. Hale's 'Man Without a Country' H-247

Nolana (*nō-lā'nạ*), a genus of perennial plants of the nolana family, native to Chile and Peru. Low growing, creeping stems with long-stemmed, fleshy oval leaves; flowers blue, or purple, bell-shaped, similar to morning-glory; also called Chilean bellflower.

Nollchucky (*nŏl'i-chŭk-i*), **Jack**, nickname of John Sevier S-108

Nollchucky River, about 150 mi. long, rises in w. North Carolina, flows n.w. into French Broad River, e. Tennessee (Douglas Reservoir): *map* T-67

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Sahara S-16, *pictures* S-15
Seed Gatherer Indians I-106*a–b*
Semitic tribes J-352
shelter. *See in Index* Shelter, *subhead* nomadic

No Man's Land, unclaimed or disputed territory, particularly various borderlands; during World War I applied to land between front-line trenches of opposing forces.

Nom de plume (*nŏm dē plụm*, French *nôñ dē plüm*), a fictitious name, especially one used by writers; also called pen name, or pseudonym.

Nome (*nōm*), Alaska, gold-mining town and seaport in center of w. coast on Seward peninsula; pop. 1876 (was over 10,000 during gold rush of 1899–1900): *maps* A-135, A-531, N-250

No'menclature, names or language used in any art or science.

Nominations, in politics
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Nominative case, in grammar N-306
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Nonane, in chemistry. *See in Index* Paraffin series

Nonclastic rocks R-169. *See also in Index* Limestone

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Noncommissioned officers
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Nonconductors, electric E-294, 297, 298

Nonconform'ists, in England, Protestants outside the established church E-356. *See also in Index* Dissenters

Nones (*nōnz*), in ancient Roman calendar the 9th day before the ides, falling in March, May, July, and October on the 7th of the month, in other months on the 5th: C-22

Non-Euclid'ean geometries G-65–6

Nonferrous alloys A-173, *table* A-174

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Nonimportation agreements, in American Colonies S-368

Non-Intercourse Act (1809), U. S. W-12

Nonmetals, in chemistry C-213, *table* P-151

Nonni (*nŏn'nē'*) **River**, Manchuria; rises in Great Khingan Mts. and flows 660 mi. to Sungari River: M-72, *map* M-72

Nonobjective art P-23, 38, *picture* P-23

Nonometer, line in poetry P-335

Nonpareil (*nŏn-pạ-rĕl'*), or **painted bunting**, bird of finch family B-353

Nonpareil type T-228

Nonpartisan election, a primary or general election provided for by state or local law in which the ballot bears no party designation for any candidate.

Nonpartisan League N-291

Nonsense rhymes and nonsense stories
Edward Lear L-142
reading, value in R-84–84*a*

Non troppo. *See in Index* Music, *table* of musical terms and forms

Noodles M-1

Noon mark, in pioneer days, a line drawn on the floor of a cabin, marking one edge of the patch of light that came through an open door or window when the sun was due south. It told the noon hour, and clocks were set by it.

Noot'ka, a group of Indian tribes that lives in British Columbia, Canada, *map* I-106*f*, *picture* I-106*c*, *table* I-108

No'pal, a genus of the cactus family; resembles the prickly pear; grown as food for cochineal insects: C-373

Noranda, town in w. Quebec, Canada, about 150 mi. n. of North Bay, Ontario; pop. 9672; copper, gold, and zinc mining; smelting plants; lumbering: *map* C-72

Nor'bert, Saint (died 1134), German ecclesiastic, archbishop of Magdeburg M-355

Nordau (*nôr'dou*), **Max** (1849–1923), Jewish author and philosopher, born Hungary; leader in European Zionist movement ('Degeneration', criticism of modern civilization).

Nordenskjöld (*nôr'dĕn-shŭld*), **Nils Adolf Erik, Baron** (1832–1901), Swedish Arctic explorer, first to accomplish (1878–79) the Northeast Passage from Atlantic to Pacific
Northeast Passage P-350, *map* P-346

Nordenskjöld, Nils Otto Gustaf (1869–1928), Swedish explorer, nephew of N.A.E. Nordenskjöld; after explorations in Patagonia, Alaska, and Greenland, led expedition to South Polar regions (1901–4); was rescued off coast of Graham Land by Argentine gunboat after own ship sank.

Nordhoff, Charles Bernard (1887–1947), author, born of American parents in London, England; married Pepé Tearai of Tahiti where he lived for several years; in collaboration with James N. Hall wrote 'Lafayette Flying Corps', 'Mutiny on the Bounty', 'Men Against the Sea', 'Pitcairn's Island', 'The Hurricane'.

Nor'dica, Lillian (1859–1914), operatic soprano, born Farmington, Me.; most famous for Wagnerian roles; died in Java after exposure from shipwreck.

Nordic subrace, of the Caucasoid race R-22–3, *chart* R-22

Nordkapp, or North Cape, Arctic island on n. coast of Norway; from here tourists view the midnight sun; generally known as the northernmost point of Europe, although Knivskjaerodden, an island about 47 mi. to the n.w., is actually farther north: *maps* N-301, E-417

Nordkyn, Cape, northernmost point on mainland of Europe.

Nördlingen (*nûrt'ling-ĕn*), town in Bavaria, s. Germany, 70 mi. n.w. of Munich; in Thirty Years' War, scene of Imperialist victory over Swedes (1634) and defeat by French (1645).

Nordrhein-Westfalen, state, Germany. *See in Index* North Rhine-Westphalia

Nor'folk, county in e. England bounded n. and e. by North Sea; 2055 sq. mi.; pop. 546,550; cap. Norwich; farming, textiles: *map* E-347

Norfolk, Neb., commercial center for agricultural district; pop. 11,335; on Elkhorn River, 95 mi. n.w. of Omaha; railroad shops, bridge works, canning plants: *maps* N-103, U-253

Norfolk, Va., seaport on Hampton Roads, opposite Portsmouth; pop. 213,513: N-242*b*–3, C-223*b*, 224, *maps* V-487, U-253
Tidewater Terminals, *picture* V-479

Norfolk Island, isolated island 800 mi. e. of Australia, which governs

it; 13 sq. mi.; pop. 938; British cable station: *map* P-16
Pitcairn settlers removed to P-11
Norfolk Naval Shipyard, at Portsmouth, Va., on Elizabeth River; builds and repairs all classes of naval vessels. *See also in Index* Portsmouth, Va.
Norfork Dam, in Arkansas, on North Fork River A-359
Noria. *See in Index* Persian water wheel
No-rinse laundry detergent S-214
Norkay, Tensing. *See in Index* Tensing Norkay
Norm, or mode, a measure of average S-385*e*
Normal curve, in statistics S-385*e*
Normal salt, in chemistry A-10
Normal school. *See in Index* Teachers, training of
Normal solutions, in chemistry S-234–5
Norman, Montagu Collet (Baron Norman of St. Clere in the County of Kent) (1871–1950), British financier; governor of the Bank of England 1920–44.
Norman, Okla., university city in livestock-raising and oil area, 18 mi. s. of Oklahoma City; pop. 27,006; state mental hospital; Naval Air Technical Training Center: *map* O-371
high-school gymnasium, *picture* E-252
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Norman, draft horse. *See in Index* Percheron
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Channel Islands once part of C-185
cheese making C-207
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Norns, in Norse mythology, the three giant goddesses who preside over the fates of both men and gods (Urd, personifying the past; Verdandi, the present; Skuld, the future); Asgard was their home.
Norridgewock, division of the Abnaki group, of Algonquian stock; lived in Canada and Maine.
Norris, Charles Gilman (1881–1945), novelist, born Chicago, Ill.; husband of Kathleen Norris and brother of Frank; journalistic work in New York; novels deal with problems of modern life ('Salt'; 'Brass'; 'Bread').
Norris, Frank (1870–1902), novelist, born Chicago, Ill., brother of Charles Gilman Norris ('The Octopus' and 'The Pit', first and second parts of an unfinished trilogy, 'The Epic of Wheat') A-230*b*
Norris, George William (1861–1944), legislator, born Sandusky County, Ohio; U. S. representative 1903–12, U.S. senator from Nebraska 1912–42; nominally Republican but independent of party ties; for reform of House rules; voted against U. S. entrance into World War I; denounced Versailles Treaty
Tennessee Valley Authority R-207
Norris, Kathleen (born 1880), novelist, born San Francisco, Calif.; wife of Charles Gilman Norris ('Mother'; 'Noon'; 'Barberry Bush'; 'Mother and Son').
Norris Dam, in Tennessee, on Clinch River T-70, *maps* T-67, T-69, *pictures* T-60, 68. *See also in Index* Dam, *table*
Norris-Doxey Cooperative Farm Forestry Act, U.S. F-239, 240
Norristown, Pa., borough 14 mi. n.w. of Philadelphia on Schuylkill River; pop. 38,126; iron, marble, limestone, sandstone in vicinity; textile machinery, hosiery, steel, iron products, cigars: *map* P-133
Norrköping (*nôr'chûp-ing*), Sweden, seaport on s.e. coast 80 mi. s.w. of Stockholm; pop. 84,939; industrial center: *maps* N-301, E-424
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Norse language. *See in Index* Scandinavian languages
Norsemen. *See in Index* Northmen
Norse mythology M-476*c–d*, *Reference-Outline* M-479
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Norstad, Lauris (born 1907), U. S. Air Force officer (became 4-star general 1952), born Minneapolis, Minn.; U. S. Air Force deputy chief of staff for operations 1947–50; commander U. S. Air Forces in Europe 1950–53, of Allied air forces in central Europe 1951–53; SHAPE air deputy commander 1953–.
North, Christopher, pen name. *See in Index* Wilson, John
North, Frederick, Baron (1732–92), later 2d **earl of Guilford** (better known as **Lord North**), British statesman; as king's agent (disclaimed title of prime minister) introduced Boston Port Bill, 1774, and against own conviction, supported George III's policies which led to American Revolution: R-122, 125, 128
offers peace R-129
North, Sir Thomas (1535?–1601?), English translator of Plutarch from the French version by Amyot (first edition 1579), vigorous style greatly influenced English prose; Shakespeare took whole speeches in 'Julius Caesar' and other plays directly from North's 'Plutarch'.
North Adams, Mass., city on Hoosac River, 50 mi. n.w. of Springfield; in Berkshire Hills near w. end of famous Hoosac Tunnel; pop. 21,567; textile printing, cotton and woolen mills, electrical specialties, shoes; State Teachers College; site of old Ft. Massachusetts: *map* M-132
North America, the 3d largest continent; 9,400,000 sq. mi.; pop. 216,000,000: N-244–66, *maps* N-245–6, 248, 250–1, 256–8, 264–5, S-249, *pictures* N-244, 255, *color pictures* N-259–62, *Reference-Outline* N-265–6. *See also in Index* America, discovery and exploration; Canada; Central America; Mexico; United States; *also* natural features by name
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North American Interim Regional Broadcasting Agreement R-42
Northampton (*nôrth-ămp'tŏn*), or **Northamptonshire**, an e. midland county of England; 914 sq. mi.; pop. 359,550; cap. Northampton; cattle: *map* E-347
Northampton, England, city, capital of Northampton County, 60 mi. n.w. of London on Nene River; pop. 104,429; shoes; site of battle in 1460 in which Yorkists captured Henry VI: *map* B-325
Henry Moore's 'Madonna and Child', *picture* S-73
Northampton, Mass., city 18 mi. n. of Springfield on Connecticut River; pop. 29,063; Smith College; silk, hosiery, brushes, cutlery; settled 1654: *map* M-132
New Haven and Northampton Canal, *map* C-108
'Northampton', U.S. Navy cruiser N-86
North Anna, stream n. of Richmond, Va.; reconnoitering engagements May 23–25, 1864, between Grant and Lee, followed by Federal outflanking maneuver toward Cold Harbor: *map* V-487
North Arlington, N.J., borough 4 mi. n.e. of Newark; pop. 15,970: *map, inset* N-164
North Atlantic Council, principal body of the North Atlantic Treaty Organization; composed of foreign ministers of member countries.
North Atlantic Current A-452, G-228*b*, O-335, *map* O-335
affects Norway climate N-302
affects Scotland climate S-63
North Atlantic Treaty Organization (NATO), a defense alliance created by the North Atlantic Treaty, signed in Washington, D. C., April 4, 1949, by the United States, Canada, Great Britain, France, Netherlands, Belgium, Luxemburg, Denmark, Norway, Italy, Portugal, and Iceland; members pledge to act together if any one of them is at-

tacked; Greece and Turkey admitted 1952, West Germany 1955; goal is a defense structure strong enough to deter Russian aggression: E-438
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North Attleboro, Mass., town 29 mi. s.w. of Boston; pop. of township, 12,146; silverware, tennis rackets, jewelry, optical goods, iron castings: *map* M-133

North Australia, division of Australia from 1926 to 1931 when it was reunited with Central Australia to form Northern Territory.

North Battleford, Saskatchewan, Canada, city 222 mi. n.w. of Regina at junction of Saskatchewan and Battle rivers; pop. 7473; grain elevators, creameries: *maps* C-68, 81

North Bay, Ontario, Canada, town about 200 mi. n.w. of Ottawa on Lake Nipissing; pop. 17,944; planing mills and sawmills, car repair and machine shops: *maps* C-69, 72

North Borneo, British colony in n. Borneo; includes island of Labuan; total area 31,000 sq. mi.; pop. 334,141: B-255, *maps* A-407, E-202

North Braddock, Pa., suburb 8 mi. s.e. of Pittsburgh; pop. 14,724; extensive steel rail works.

Northbridge, Mass., town 12 mi. s.e. of Worcester on Mumford River; pop. of township, 10,476; textiles, textile machinery, embossed paper, silk: *map* M-132–3

North Cape. *See in Index* Nordkapp

North Carolina, a s. Atlantic state of U. S.; 52,712 sq. mi.; pop. 4,061,929; cap. Raleigh: N-267–80, *maps* N-274–5, 268, 271, U-253, 275, *pictures* N-267–8, 277-80
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'North Carolina', battleship, *picture* N-85

North Carolina, University of, at Chapel Hill, N. C.; state control; chartered 1789; opened 1795; State College of Agriculture and Engineering at Raleigh and Woman's College at Greensboro consolidated with university 1931; arts and sciences, business administration, dentistry, journalism, library science, nursing, public health, social work; graduate school: N-280, *picture* N-280

North Carolina College at Durham, at Durham, N. C.; state control; founded 1910; arts and sciences, law; graduate school.

North Carolina pine, a common name sometimes applied to the loblolly and shortleaf pines. *See in Index* Shortleaf pine

North Central Association of Colleges and Secondary Schools C-383

North Central College, at Naperville, Ill.; Evangelical United Brethren; founded 1861; name changed 1926; arts and sciences, music.

North Central Plains, in U.S. U-284–90, *map* U-286–7, *Reference-Outline* U-336*b*–8. *See also in Index* United States, *subhead* geographic regions; *also* names of states

North China Central Control Area, an administrative division of Chinese People's Republic; includes part of Inner Mongolia: M-342, *map* M-343

Northcliffe, Alfred Harmsworth, first **Viscount** (1865–1922), English newspaper proprietor, one of the most powerful figures in 20th-century journalism; owner of *London Times, Daily Mail, Evening News,* founder of Amalgamated Press, large periodical business.

Northcote (*nôrth'kōt*), **James** (1746–1831), English historical and portrait painter and author; paintings: 'Murder of the Princes in the Tower', 'Death of Wat Tyler'; wrote biographies of Reynolds and Titian.

North Dakota, a plains state of n.w. U. S.; 70,665 sq. mi.; pop. 619,636; cap. Bismarck: N-281–93, *maps* N-288–9, 282, 285–6, U-252–3, 286, *pictures* N-281–2, 286, 291–3
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North Dakota, University of, at Grand Forks, N. D.; state control; founded 1883; arts and sciences, commerce, education, engineering, law, medicine, military science, nursing; graduate division: *picture* N-292

North Dakota Agricultural College, at Fargo, N. D.; state control; opened 1891; agriculture, applied arts and sciences, chemical technology, engineering, home economics, pharmacy; graduate studies.

Northeast Administrative Area, a division of Chinese People's Republic; includes e. and s. Manchuria: M-72, *map* M-72

Northeastern State College, at Tahlequah, Okla.; state control; founded 1846 as Cherokee National Female Seminary; state college 1909; arts and sciences, education; graduate study.

Northeastern University, at Boston, Mass.; founded 1898; liberal arts, business administration, engineering, law, technical institute; graduate division.

Northeast Missouri State Teachers College, at Kirksville, Mo.; state control; founded 1867; liberal arts, education, music, business; graduate study.

Northeast Passage, a passage by sea to the Orient around northern Europe and Asia; attempted by explorers from 16th century on; finally accomplished 1879 by Baron Nils Nordenskjöld. The modern Northeast Passage is the northern sea route between Archangel and Vladivostok: C-9, P-350, *map* P-346

Norther, cold wind from north or northwest W-150

Northern Cross. *See in Index* Cygnus

Northern Crown, or Corona Borealis, a constellation in the northern sky, *charts* S-377, 380

Northern Dvina River, 455 mi. long, formed by union of Sukhona and Yug rivers in n. Russia, flows n.w. into White Sea; icebound half the year; including the Sukhona, the Northern Dvina is about 800 mi. long: *maps* R-266, E-417, 419
Northern fur seal S-90
Northern Hemisphere, *diagram* E-176, *map* A-531
Northern Ireland, a part of the United Kingdom with a separate parliament; land area 5238 sq. mi.; pop. 1,370,709; cap. Belfast: I-230*b*–2, *maps* I-227, B-321, 324–5, *pictures* I-231–2, *Reference-Outline* G-174–7
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Northern pike, a game fish P-256, *color picture* F-118
Northern Rhodesia, s.-central Africa, British protectorate; 287,950 sq. mi.; pop. 2,114,518. *See also in Index* Rhodesia and Nyasaland, Federation of
Northern scallop shell (*Pecten islandicus*), *color picture* S-140
Northern sea lion S-90
Northern Securities Case, U. S. (1904) R-223, U-349
Northern Sporades, Greek islands in Aegean. *See in Index* Sporades
Northern State Teachers College, at Aberdeen, S.D.; state control; opened 1902; arts and sciences, education; graduate study in education.
Northern Territories, a British protectorate, administrative division of Gold Coast in w. Africa; administration headquarters Tamale; 30,486 sq. mi.; pop. 1,110,400: G-134*b*, *map* A-46
Northern Territory, the n.-central part of Australia; 523,600 sq. mi.; pop. 10,868; cattle raising, gold and tin mining: *map* A-488
Northern War (1700–21), between Charles XII of Sweden and Denmark, Russia, Poland C-195, P-167
Northern white cedar, or **American arborvitae,** evergreen tree, leaves yellow-green, in flat sprays; cones ½ in. long, pale brown; many varieties; oil distilled from leaves used in insecticides and liniments; also called arborvitae, white cedar, swamp cedar, or cedar: A-296
used in hedges H-329
North Georgia College, at Dahlonega, Ga.; state control; founded 1873; arts and sciences, military.
North German Confederation G-97, B-198, W-135–6
North Holland, a province of the Netherlands; cap. Haarlem: H-407
North Island, 2d largest island of New Zealand; 44,281 sq. mi.; pop. 1,313,869: N-227, *maps* A-478, P-16, N-228, *inset* A-489
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North Korea. *See in Index* Korea
North Las Vegas, Nev., city adjoining Las Vegas; pop. 3875; Nellis Air Force Base nearby: *map* N-133
North Little Rock, Ark., city on n. bank of Arkansas River, opposite Little Rock; pop. 44,097; wood products; railroad shops; Camp Robinson nearby: *map* A-366
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North Miami, Fla., town 8 mi. from Miami; pop. 10,734: *map* F-159
North Mountains, in Pennsylvania. *See in Index* Kittatinny Mountains
North Pacific Current W-34, *map* O-336
North Pacific Planning Project, Canada and United States C-90
North Pacific region, U. S. U-306–9, *map* U-307, *Reference-Outline* U-338–9. *See also in Index* United States, *subhead* geographic regions; *also* names of states
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North Park, plateau in n. Colorado, *map* C-402
North Plainfield, N. J., residential suburb of New York City; pop. 12,766.
North Platte, Neb., city in s.w.-central part of state, at junction of N. and S. Platte rivers; pop. 15,433; railroad terminal; food products: *maps* N-102, U-252
North Platte River, rises in Rocky Mts. at junction of Grizzly and Little Grizzly creeks, Jackson County, Colo.; crosses Wyoming and unites with s. fork to form Platte River in Nebraska; 618 mi.: *maps* W-316, 323, N-95, U-296
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North Rhine-Westphalia, German **Nordrhein-Westfalen** (*nôrt'rin vĕstfä'lĕn*), state in British zone, Germany; area 13,157 sq. mi.; pop. 13,196,176: *map* G-88
North Riding, administrative district in York County, England, *map* E-347
North River, lower course of Hudson River N-215
Northrop, John Howard (born 1891), biochemist, born Yonkers, N. Y.; with Rockefeller Institute for Medical Research since 1916; for preparing enzymes and virus proteins in pure form, he shared 1946 Nobel prize in chemistry with his colleague Wendell M. Stanley and with James Batcheller Sumner.
North Sea, the part of the Atlantic between Great Britain and Europe N-298, *maps* E-416, 419, 424. *See also in Index* Ocean, *table*
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North Star, also **polestar,** or **Polaris,** star nearest in line above North Pole S-372, *charts* S-373–4, 379–80
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North Sydney, Nova Scotia, Canada, town on Sydney Harbor, Cape Breton Island, 5 mi. n. of Sydney; pop. 7354; fine harbor; fishing.
North Texas State College, at Denton, Tex.; state control; founded 1890; arts and sciences, business, education, home economics, music, air science; graduate study.
North Tonawan'da, N. Y., manufacturing city 10 mi. n. of Buffalo on Niagara River, opposite Tonawanda, and on Erie Canal; pop. 24,731; lumber, iron: *map* N-204
Northum'berland, John Dudley, duke of (1502–53), English statesman, an unprincipled and subtle intriguer; controlled government during part of reign of Edward VI; executed following plot to put Lady Jane Grey on throne: G-215
Northumberland, large county in extreme n.e. of England; 2019 sq. mi.; pop. 798,175; sheep raising, coal and iron mining; chief city, Newcastle-upon-Tyne: *map* E-347
Northumberland Strait, of Canada, separates Prince Edward Island from New Brunswick and Nova Scotia P-411, *map* C-73
Northumbria (*nôrth-ŭm'brĭ-ă*), ancient kingdom in n.e. England, most powerful on island in 7th century; made tributary to Wessex in 827: A-152, *map* E-358
North Vancouver, British Columbia, Canada, city on n. shore of Burrard Inlet, opposite city of Vancouver; pop. 15,687; ships lumber; tourist center: *maps* C-68, 80
Northwest, in U. S. *See in Index* Far West
Northwest Administrative Area, a division of Chinese People's Republic; includes part of Inner Mongolia: M-342, *map* M-343
Northwest Angle, part of Minnesota, and the northernmost point of the United States; formed where the United States-Canadian boundary slants abruptly up and back through the Lake of the Woods cutting off a promontory on lake's w. shore; promontory (area about 150 sq. mi.) can be reached only by water or by crossing Canadian territory. Result of geographic error when boundary was defined in 1783: *map* M-286, *table* U-246
North West Cape, on w. coast of Western Australia, *maps* A-488, 478

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British Columbia B-316
Fort William founded F-243
Manitoba M-80
rivalry with Hudson's Bay Company F-324–5, H-438
Northwestern State College, at Alva, Okla.; state control; founded 1897; liberal arts, education.
Northwestern State College of Louisiana, at Natchitoches, La.; state control; founded 1884; arts and sciences, applied arts and sciences, education.
Northwestern University, at Evanston and Chicago, Ill.; Methodist board; chartered 1851; opened 1855; liberal arts, commerce, education, journalism, music, speech, technological institute, graduate school in Evanston; commerce, dentistry, law, medicine, university college in Chicago
Deering Library, *picture* I-30
North-West Frontier Province, province of w. Pakistan, bordered by Afghanistan and Kashmir; includes province proper (area 13,560 sq. mi.; pop. 3,252,747; cap. Peshawar) and frontier regions, made up of tribal areas and princely states (area 25,699 sq. mi.; pop. 2,647,158). On w. border is Khyber Pass. Before becoming part of Pakistan in 1947, the North-West Frontier Province had been administered by princely families and British India: *maps* I-68*a*
North-West Fur Company. *See in Index* North West Company
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Northwest Missouri State College, at Maryville, Mo.; state control; founded 1905; liberal arts, education.
North West Mounted Police, former name of Royal Canadian Mounted Police.
Northwest Nazarene College, at Nampa, Idaho; Nazarene; founded 1913; arts and sciences.
Northwest Passage C-95*a*, A-190, *map* A-189
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Northwest Territory, region in U. S. n. of Ohio River from which Ohio, Indiana, Michigan, Illinois, and Wisconsin were formed: N-298–9
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North'wich, England, town 20 mi. s.e. of Liverpool; pop. 17,480; salt mines: *map* B-325
Norton, Caroline Elizabeth Sarah (1808–77), English novelist and poet, granddaughter of Richard Brinsley Sheridan; model of the witty heroine in George Meredith's 'Diana of the Crossways'; she and her two sisters, Georgy and Helen, were called the "three graces."
Norton, Charles Eliot (1827–1908), scholar and author, born Cambridge, Mass.; made prose translation of Dante; editor 'Poems of John Donne'.
Norton, Thomas (1532–84), English lawyer, political leader, and poet; wrote, with earl of Dorset, 'Gorboduc', earliest English tragedy.
Norwalk, Conn., city on Long Island Sound, 40 mi. n.e. of New York City; pop. 49,460; hats, handbags, electrical goods, pumps, tires, tubes, clothing, auto accessories, hardware; oyster culture; burned by British and Hessians in Revolutionary War: *map* C-444
Norway, a kingdom of n.w. Europe, in w. part of Scandinavian peninsula; 125,000 sq. mi.; pop. 3,278,546; cap. Oslo: N-299–305, S-55, *maps* E-416, 417, 424, N-301, P-346, *pictures* N-299–300, 303–4*b*, *Reference-Outline* S-466–7
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Norwegian Sea, part of the North Atlantic Ocean, n.w. of Norway, *maps* E-419, W-204–5
Nor'westers, The. *See in Index* North West Company
Norwich (*nŏr'wich*), Conn., city at head of navigation on Thames River, 35 mi. s.e. of Hartford; pop. 23,429; paper, textiles, leather goods; settled 1659: *map* C-445
Norwich (*nŏr'ich*), England, manufacturing and trade center, capital of Norfolk County, on Wensum River near North Sea, 100 mi. n.e. of London; pop. 121,226; fine Norman cathedral; importance dates from Middle Ages: *map* B-325
Norwich terrier, dog native to England, *table* D-118*b*
Norwich (*nŏr'wich*) **University**, at Northfield, Vt.; for men; founded 1819; arts and sciences, aviation administration, business administration, chemistry, engineering, engineering management, military training.
Norwood, Mass., town 14 mi. s.w. of Boston; pop. of township, 16,636; printing plants; leather, roofing materials: *map, inset* M-132
Norwood, Ohio, suburb n.e. of Cincinnati; pop. 35,001; machinery, office furniture, playing cards: *map, inset* O-357
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Nosing. *See in Index* Architecture, *table* of terms
Nostradamus (*nŏs-tra-dā'mŭs*) (**Michel de Notredame**) (1503–66), French astrologer, born at Saint-Rémy in Provence, of Jewish parents who were later converted to Christianity; studied medicine; claimed he could foretell events, and in 1550 began writing his 'Centuries', mystic prophecies.
Notary public. *See in Index* Law, *table* of legal terms
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Notation, in mathematics. *See in Index* Number system
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Notornis (*nō-tôr'nis*), a genus of primitive flightless birds; inhabit the South Island of New Zealand; believed extinct until 1949 when two were photographed.
Notredame, Michel de. *See in Index* Nostradamus
Notre Dame, cathedral of Paris, France; beautiful example of early Gothic architecture; situated on Ile de la Cité, a small island in Seine River; construction begun by

Bishop Maurice de Sully in 12th century; completed 1304; magnificent rose windows, one of which is 42 feet in diameter; twin towers: P-83*b*, S-78*a*, *map* P-83*a*, *pictures* A-314–15, P-83
chimeras, *picture* S-78

Notre Dame, University of, at Notre Dame, Ind., near South Bend; Roman Catholic; for men; opened 1843; arts and letters, commerce, engineering, law, science; graduate school: S-282, *pictures* I-82
football history F-232

Notre Dame College, at Cleveland, Ohio; Roman Catholic; for women; founded 1922; arts and sciences.

Notre Dame College of Staten Island, at Grymes Hill, Staten Island, N. Y.; Roman Catholic; for women; opened 1931; chartered 1933; arts and sciences, education.

'Notre Dame de Paris' ('The Hunchback of Notre Dame'), romance by Victor Hugo built around love of Quasimodo, the hunchback, for Esmeralda, a street dancer; vivid picture of medieval Paris.

Notre Dame Mountains, in Quebec Q-5, *map* C-73

Notre Dame of Maryland, College of, at Baltimore, Md.; Roman Catholic; for women; founded 1895; arts and sciences.

Notre Dame Seminary, at New Orleans, La.; Roman Catholic; for men; founded 1923; history, philosophy, religion; graduate study.

Nott, Eliphalet (1773–1866), educator and inventor; born Ashford, Conn.; president Union College; invented base burner for stoves.

Not'tingham, also **Nottinghamshire,** or **Notts,** county in central England; 844 sq. mi.; pop. 841,083; cap. Nottingham: *map* E-347

Nottingham, England, city 110 mi. n.w. of London on Trent River, capital of Nottingham County; pop. 306,008; lace and hosiery manufactures; Arkwright built first spinning mill here. Hargreaves a yarn mill: *map* B-325
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Nottingham, sheriff of
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No'tus, in Greek mythology, the south wind A-29

"Not worth a Continental" M-338

Noun N-306, *table* G-148
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relation to verb V-449, S-100

Nourse, Joel (1803–?), inventor, born Shrewsbury, Mass.; perfected cast-iron plow, 1842, which he manufactured at Worcester, Mass.: A-59

Nouvelle Calédonie, French overseas department, in s.w. Pacific. *See in Index* New Caledonia

Novachord, electric musical instrument invented by Laurens Hammond; similar in appearance to spinet; tones produced by vacuum tube oscillators and resemble those of harpsichord, violin, trumpet, and guitar.

Novac'ulite, fine-grained rock made of quartz particles
Arkansas deposits A-360

Novae (*nō'vē*), or **new stars** S-373

Novaes (*nō-vä'ăs*), **Guiomar** (born 1895), pianist, born Brazil; graduated Paris Conservatory; concert appearances Europe and Brazil; U. S. debut in New York City 1915.

Novalis (*nō-vä'lis*), pen name of Friedrich Leopold Freiherr von Hardenberg (1772–1801), German romantic poet and novelist ('Hymns to Night').

Nova Lisboa (*nō'vȧ lēzh-bō'ȧ*), formerly **Huambo** (*wäm'bō*), town of Angola, s.w. Africa; pop. 28,297: *map* A-47

Novara (*nō-vä'rä*), city in n. Italy 30 mi. w. of Milan; pop. 52,269; railroad center; textiles: *map* E-425

No'va Scotia (*skō'shą*), a maritime province of Canada; 21,068 sq. mi.; pop. 642,584; cap. Halifax: N-307–9, *maps* C-69, 73, *pictures* N-307–9
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Novaya Zemlya, also **Nova Zembla,** "new land," two islands in Arctic Ocean belonging to Russia; 35,000 sq. mi.: *maps* R-266, A-406

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Novena, in Roman Catholic church, nine days of devotion, public or private, to obtain special graces; adopted from Apostles' nine days of prayer between Ascension and Pentecost.

Noverre (*nō-vêr'*), **Jean Georges** (1727–1810), French choreographer and dancer, born Paris, France; dance director at the Opéra, Paris 1776–80; instituted important reforms in ballet: D-14*h*

Novgorod (*nôv'gô-rŏd*), historic town in w. Russia 100 mi. s. of Leningrad near n. end of Lake I'men; pop. 37,300; capital of 9th-century Russian kingdom; great trade center in Middle Ages: *map* R-266
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Novi Sad (*nō'vē säd*), German **Neusatz** (*noi'zäts*), Hungarian **Ujvidek** (*ą'yŭ-vi-dāk*), Yugoslavia, city in n. on Danube River, in former Hungarian district of Vovvodina; pop. 83,223: *maps* B-23, E-416, 417

Novitiate (*nō-vĭsh'i-āt*), or **novice-ship,** in religious community M-358

Novocaine (*nō'vō-kān*), a local anesthetic A-247, B-147

Novorossisk (*nô-vō-rō-sēsk'*), Russia, seaport on n.e. coast of Black Sea; pop. 95,280; commerce in naphtha, cement, tobacco: *maps* R-267, B-204, E-417

Novosibirsk (*nô-vō-sē-bērsk'*), Russia, in w. Siberia; administrative region of R.S.F.S.R.; 235,900 sq. mi.; cap. Novosibirsk: *map* R-260

Novosibirsk, capital of Novosibirsk region, Russia; pop. 750,000; junction of Trans-Siberian Ry. and line to Turkestan; iron and steel, lumber, flour: S-174, *maps* R-259, A-406

'No'vum Or'ganum' ("new method"), philosophical work in Latin by Francis Bacon on inductive method of reasoning, published 1620.

Nox, in Roman mythology, goddess of night, corresponding to Greek Nyx.

Noyes (*noiz*), **Alfred** (born 1880), English poet, born Staffordshire; (poems: 'Drake, an English Epic', 'Forty Singing Seamen, and Other Poems', 'Tales of the Mermaid Tavern', 'The Torch-Bearers', 'Collected Poems'; verse play: 'Sherwood; or, Robin Hood and the Three Kings').

Noyes, Arthur Amos (1866–1936), chemist, born Newburyport, Mass.; on faculty at Massachusetts Institute of Technology 1887–1909, at California Institute of Technology after 1915; work in theoretical, analytical, and organic chemistry.

Noyes, John Humphrey (1811–86), Congregational minister, born Brattleboro, Vt. *See also in Index* Oneida Community

Noyes, William Albert (1857–1941), chemist, born near Independence, Iowa; first chief chemist National Bureau of Standards 1903–7; professor at University of Illinois 1907–26; noted for research in electronic theories and for determinations of atomic weights.

Noyes, William Albert, Jr. (born 1898), chemist, born Terre Haute, Ind.; son of chemist William Albert; professor at University of Rochester from 1938; research in photochemistry and electrochemistry ('Modern Alchemy', with father).

Noyon (*nwä-yôñ'*), France, historic town 60 mi. n.e. of Paris; pop. 5900; Charlemagne crowned king in 768; birthplace of Calvin.

NPA (National Production Authority), in U. S. U-368

NRA. *See in Index* National Recovery Administration

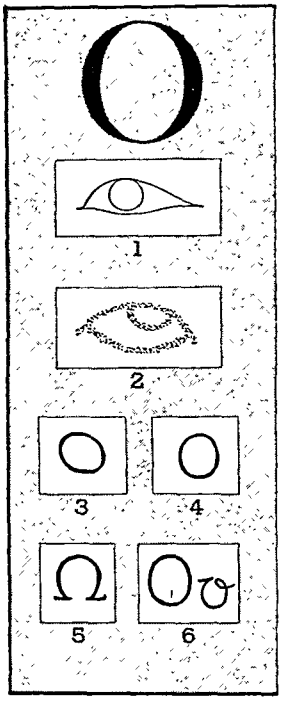
Nu'ba, a Nubian; also one of a Negro people of Kordofan related to the Nubians: S-442, 442*a*, *picture* A-53

Nu'bia, region and ancient country in n.e. Africa, s. of Egypt S-441, 442*a*, *map* P-156

Nubian Desert, great desert in Africa between Red Sea and w. bend of Nile River, *maps* E-271, A-42, 46
camel rider, *color picture* A-38

Nubian goat G-128
Nuclear chemistry C-220
Nuclear physics, a branch of physics which deals with forces and phenomena arising within the nuclei of atoms A-460–70, *pictures* A-461–3, 465–9, *tables* A-460, 464, 470
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Nucleolus (*nū-klē'ō-lŭs*), in cell, *color picture* B-149
Nucleonics, the study of nuclear energy and the changes that take place within the nucleus of an atom. *See also in Index* Nuclear physics
Nucleus (*nū'klē-ŭs*), of atom A-457–62*b*, C-212, M-142*g–h*. *See also in Index* Atom, *subhead* "smashing"
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Nucleus, of comet C-420
Nueces (*nwā'sēs*) River, in s. Texas, 400 mi. long; enters Gulf of Mexico via Corpus Christi Bay: *maps* T-78, U-279
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Nueva Esparta (*nwā'vä ĕs-pär'tä*), island group in Caribbean Sea, a state of Venezuela; cap. La Asunción: *table* W-94
Nuevo León (*nǫ-wā'vō lā-ōn'*), Mexico, state in n.e.; 25,134 sq. mi.; pop. 735,692; cap. Monterrey: *map* M-194–5
Nullarbor (*nŭl-är'bĕr*) Plain, coastal area in s. Australia, inland from the Great Australian Bight, *maps* A-488, 478, *picture* A-476
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Numbers, Book of, fourth book of Old Testament, so called because it begins with account of census.
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Numidia (*nū-mĭd'ĭ-ą*), ancient kingdom and Roman province in n. Africa corresponding nearly to modern Algeria.
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Nu'mitor, in Roman legend, king of Alba Longa, ancestor of Romulus and Remus R-198
Nummulite (*nŭm'ū-līt*) (from Latin *nummus*, "coin"), a genus of *Foraminifera*, practically extinct, whose many-chambered spiral shells, resembling coins, form bulk of Tertiary limestone.
Nun M-358. *See also in Index* chief orders by name
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Nunc Dimittis (*nŭngk dĭ-mĭt'ĭs*) ("Now Thou lettest depart"), the song of Simeon (Luke ii, 29–32), part of the liturgy of the Roman Catholic and Anglican churches; so named from the opening words in the Latin version of the song.
Nuncio (*nŭn'shĭ-ō*), diplomatic representative of the pope.
Nuncupative (*nŭng'kū-pā-tĭv* or *nŭng-kū'pą-tĭv*) will W-134
Núñez Cabeza de Vaca. *See in Index* Cabeza de Vaca
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Nun's veiling, a fine worsted fabric originally made in black and used for nuns' veils.
Nureddin (*nųr-ĕd-dēn'*), Mah'mud (1116?–74?), sultan of Syria and Egypt
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Nuremberg (*nū'rĕm-bĕrg*), also Nürnberg, Germany, city of n. Bavaria; pop. 362,459: N-313–14, *maps* G-88, E-416, 425, *pictures* E-436, N-313
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Nuthatches, a family of small tree-climbing birds N-314–16, *picture* N-314
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Nutley, N. J., town on Passaic River, chiefly residential, 3 mi. s. of Passaic; pop. 26,992; plastic materials: *map*, *inset* N-164
Nutmeg, seed of nutmeg tree, used as spice N-316, *pictures* S-341, *color picture* P-288
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Nutmeg State, popular name for Connecticut C-437
Nut pine, or piñon, tree of s.w. United States P-258
Nutria, a fur. *See in Index* Coypu
Nutrition (*nū-trĭsh'ŏn*), process by which living organisms obtain, modify, and use nutrients for growth and repair. *See also in Index* Digestion; Food; Hygiene; Vitamins
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Nuttall, Thomas (1786–1859), English botanist and ornithologist, among first to make wide survey of American plants and birds; made trip up Missouri River 1809–11; explored along Arkansas and Red rivers 1818–20; accompanied Wyeth expedition to mouth of Columbia River 1834–35.
Nuuanu (*nųų-ų-ä'nų*) Pali, Hawaiian Islands, mountain pass 6 mi. n.e. of Honolulu: H-288, *map* H-286
Nux vomica (*nŭks vŏm'ĭ-ką*), tree of the logania family; seeds yield the drugs nux vomica and strychnine: S-432, *picture* P-341
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Nyanza (*nī-ăn'zą*), in Central Africa, native word for lake V-471
Nyasa (*nī-ăs'ą*), Lake, large lake on e. boundary of Nyasaland protectorate; 14,000 sq. mi.; surrounded by mountains; discovered 1859 by David Livingstone: *maps* E-199, A-47, 42
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Nyasaland (*nī-ăs'ą-lănd*), s.e. Africa, British protectorate; 37,600 sq. mi. (exclusive of 10,350 sq. mi. of inland waters); pop. 2,178,013. *See also in Index* Rhodesia and Nyasaland, Federation of
Nyctaginaceae. *See in Index* Four-o'clock family
Nye (*nī*), Edgar Wilson (Bill Nye) (1850–96), humorist, born Shirley, Me. ('History of the United States'; 'Remarks').
Nylon (*nī'lŏn*), a proteinlike synthetic product N-317–18, *pictures* N-318, *table* F-6
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Nyssaceae (*nĭ-sā'sē-ē*), a plant family of trees and shrubs. *See also in Index* Tupelo; Tupelo gum
Nystad (*nü'städ*), **Peace of** (1721), treaty between Russia and Sweden, signed at Nystad, a small port on Gulf of Bothnia P-167, S-466
Nyx (*nĭks*), in Greek mythology, goddess of night, corresponding to Roman Nox.



OUR LETTER O probably started in Egyptian writing as a picture (1) which meant 'eye'. Soon after 2000 B.C., a Semitic people called the Seirites adopted it as an alphabetic sign for a peculiar sound, a sort of deep growl, which came first in their word *ayin* or *ain* for 'eye'.

The Seiritic sign, like the Egyptian, was a crude picture of an eye (2). The later Canaanite-Phoenician alphabet simplified it to a circle (3). Its name, in all Semitic languages, resembled the Hebrew name *ayin*.

When the Greeks learned to write from the Phoenicians, they had no growled *ayin* sound in their speech, and they had no use for the sign with its Phoenician meaning. They did want signs, however, for several vowels which Semitic people never indicated in their writing. The Greeks therefore used the *ayin* sign for the vowel *o*. They called the sign *omicron* (4).

Later they used this sign only for the shorter 'o' sound as in 'obey', and cut off the bottom to make *omega* (5) for the longer 'o' sound as in 'oats'. Since *omega* was a new sign, they put it at the end of their alphabet. Hence we often say 'from alpha to omega', meaning 'from beginning to end', since *alpha* was the first letter of the Greek alphabet.

The Romans, however, were content with only one 'o' in their Latin alphabet, and they chose the simpler *omicron*. From Latin the sign came without change into English. The capital and the small letter, in both printing and handwriting, are distinguished only by size, except that handwritten ones are often connected with their neighbors (6).

NOTE.—For the story of how alphabetic writing began and developed, *see* the articles Alphabet; Writing.

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Oahu (*ō-ä'hụ*), one of Hawaiian Islands; 589 sq. mi.; pop. 353,020: H-287–8, *maps* H-286, P-17
Tripler Army Hospital, *picture* H-290
Oak, a hardwood tree O-319–20, *pictures* T-180, 182–3, O-319–20, *table* W-186*c*
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Oak, cork C-479–80, *pictures* C-479
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Oak, Royal, sheltered Charles II C-192, T-184
Oak, "shin," or dwarf "chinquapin" C-287
Oak apple, an oak gall or gallnut. *See in Index* Galls
Oak Creek Canyon, s. of Flagstaff, Ariz., *color picture* U-300
Oakland, Calif., residential and industrial city on San Francisco Bay opposite San Francisco; pop. 384,575: O-320–1, *maps* U-252, *inset* C-34, *picture* O-321
bridge to San Francisco B-308, *pictures* B-307, O-321, S-41. *See also in Index* Bridge, *table*
Oak Leaf Cluster, U. S. Army decoration of honor D-38
Oakley, Annie (1860–1926), markswoman, born in Darke County, Ohio; in vaudeville and with circus troupes; markswoman in Buffalo Bill's Wild West Show 1885–1902; toured in United States and Europe.
Oakley, Violet (born 1874), painter, born New York City; studied in U. S. and Paris, France; did murals for the State Capitol at Harrisburg, Pa., and the county courthouse at Cleveland, Ohio.
Oak Park, Ill., residential suburb w. of Chicago, formerly part of Cicero; pop. 63,529; incorporated as village 1902: *map, inset* I-36
Oak Ridge, Tenn., federal area 17 mi. w. of Knoxville; created by U.S. government during World War II for manufacture of atomic bomb material; war pop. reached 75,000; pop. (1950 census) 30,229; location of Oak Ridge Operations Office, including National Laboratory, Institute of Nuclear Studies, and American Museum of Atomic Energy: *maps* T-67, U-253, *picture* T-58
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Oarfish, or ribbonfish, a large deep-sea fish (*Regalecus glesne*) F-100
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Oasis (*ō-ā'sĭs* or *ō'ą-sĭs*), fertile spot in a desert N-242*b*, D-73*a*
Africa A-40: Libyan Desert E-270, L-218, *picture* L-219; Sahara S-15–16
Asia A-414: Arabia A-286; Iran I-222
products D-73*b*
Oastler, Richard (1789–1861), English reformer; called "the factory king" because of energetic advocacy of the factory workers' cause.
Oates, Lawrence Edward Grace (1880–1912), English army officer and polar explorer with Scott S-66
Oates, Titus (1649–1705), English conspirator, who falsely accused the Catholics of a "popish plot" (1678–80) to restore Catholicism.
Oath, or pledge
armed forces, *picture* C-319*e*
fealty F-61
Four-H Club F-251, 252
Girl Scouts G-115
naturalization, U. S. N-43, *picture* C-319*f*
pledge to U.S. flag F-124
president of U.S. P-408
Quakers refuse to take Q-2
Oatmeal, a breakfast cereal. *See in Index* Oats, *subhead* rolled
Oatmeal biscuits B-295
Oats O-321–2, *picture* O-322
grain elevator G-147, *picture* G-147
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rusts and smuts R-297–9, *picture* R-297
starch content S-382
Oaxaca (*wä-hä'kä*), Mexico, state in S., on Pacific; 36,371 sq. mi.; pop. 1,414,516; cap. Oaxaca (de Juarez): *map* M-195
Oaxaca (de Juarez), Mexico, industrial city in beautiful Oaxaca valley, 225 mi. s.e. of Mexico City; capital of Oaxaca state; pop. 46,156; formerly Huaxyacac, Aztec military post: M-188, 202, 206, *maps* M-189, 195
Tree of Tule T-184

Obadiah (*ō-bā-dī'ā*) (6th century B.C.), Hebrew minor prophet, author of the 31st book of the Old Testament, which bears his name. Book denounces Edomites.

Obbligato, in music. *See in Index* Music, *table* of musical terms and *forms*

O'bed, in Old Testament, son of Ruth and Boaz R-299

Obedience trials, of dogs D-120

Ob'elisk, a four-sided tapering shaft with a pyramidal top; a favorite form of monument of the ancient Egyptians
Cleopatra's Needle A-150, *picture* N-218
Obelisk of Luxor, Paris, France P-83*b*, *picture* P-84
Rome, *picture* P-65

Oberammergau (*ō-bĕr-äm'ĕr-gou*), village in Bavaria, 43 mi. s.w. of Munich; pop. 5101: O-322–3, *map* G-88, *picture* O-323

Oberhausen (*ō'bĕr-hou-zĕn*), Germany, manufacturing city just w. of Essen; pop. 202,808; known for ironworks and chemical works: *map, inset* G-88

Ob'erhoffer, Emil (1867–1933), American musician, born Munich, Germany; organizer and conductor (1903–22) of Minneapolis Symphony Orchestra.

Oberkampf, Christophe Philippe (1738–1815), textile printer, born Bavaria; learned how to print cloth from carved rolls; 1768 started plant at Jouy, near Paris, France; plant destroyed in 1815
toile de Jouy, *picture* T-106

Oberlin (*ō-bĕr-lăn*), **Jean Frédéric** (1740–1826), Alsatian Lutheran clergyman, born Strasbourg, France; improved industry, agriculture, education, built roads; Oberlin, Ohio, named for him.

Oberlin College, at Oberlin, Ohio; founded 1833; first coeducational college in U. S.; arts and sciences, music, theology: *picture* O-350
aluminum solvent discovered at H-249

Oberon (*ō'bĕr-ŏn*), in English folklore, king of the fairies; Titania is his queen
'Midsummer Night's Dream' M-240

Oberth (*ō'bĕrt*), **Hermann** (born 1894), German mathematician and physicist, born present Sibiu, Rumania; author of books on space travel: S-309*a*

Obesity, excessive fatness
diet and F-216, 217, H-302–3

Obi (*ō'bi*), a broad sash worn by Japanese women J-303

Objective, in optics, the lens in an optical system nearest the object viewed
microscope type M-232–5
telescope type T-46, 47

Objective case, in grammar N-306

Oblate spheroid, the shape of the earth E-192

Oboe (*ō'bō*), or **hautboy**, a wood-wind musical instrument W-189, R-88*a*, *picture* M-471
range of, *diagram* M-468*b*

Obolus (*ŏb'ō-lŭs*), a modern Greek unit of weight, equal to 1.54 grains or 0.1 gram (metric); in ancient times, equal to 11.0 grains or 0.71 gram.

Obregón (*ō-brā-gōn'*), **Alvaro** (1880–1928), Mexican general and president of Mexico M-208

Obrenovitch (*ō-brĕn'ō-vĭch*), ruling Serbian family; held power (not continuously) from accession of Milosh Obrenovitch (1813) to assassination of Alexander (1903): S-103

Obrenovitch, Milosh, or Milosch (1780–1860), prince of Serbia, born a peasant; for services in freeing Serbia from Turkish rule called "father of his country": S-103

O'Brien, Edward (Joseph Harrington) (1890–1941), editor and anthologist, born Boston, Mass.; editor of annual 'Best Short Stories' 1915–40 and 'Best British Short Stories' 1921–40; selected many of the short stories from "little," experimental magazines.

O'Brien, Forest, American aviator, *table* A-104

O'Brien, Frederick (1869–1932), writer, born Baltimore, Md.; went to sea at 18 and afterward traveled widely ('White Shadows in the South Seas'; 'Mystic Isles of the South Seas'; 'Atolls of the Sun').

O'Brien, Jeremiah (1744–1818), U.S. Navy officer, born Kittery, Me.; with five brothers and other volunteers captured two British ships off Matthias, Me. (1775); later commanded first ships of Massachusetts navy.

Ob (*ŏb*) **River**, great navigable river of w. Siberia; flows n.w. and n. 2500 mi. to Gulf of Ob, bay of Arctic Ocean; chief tributary, the Irtish: *maps* R-259, A-406, 411–12
length, comparative. *See in Index* Rivers, *table*

Observation balloon B-30–1, 32, 34, *pictures* B-31, 32, 33

Observatory O-324–6, A-442–3, *pictures* O-324–6
telescopes T-46–9, *pictures* T-46–9
time fixed by O-325

Obsid'ian, a glasslike lava used as an ornamental stone L-138, J-350, M-266–7
geological classification. *See in Index* Rock, *table*

Obstetrics, in medicine M-164*a*

Obtuse angle, in mathematics, *diagram* G-61

Ocala (*ō-kăl'ą*), Fla., city 77 mi. s.w. of St. Augustine; pop. 11,741; fruit; processed food; limestone: *map* F-158
Silver Springs nearby F-163, *picture* F-163

Ocampo (*ō-käm'pō*), **Victoria** (born 1891), Argentinian writer, born Buenos Aires; educated in France; founded literary review *Sur* 1931; known as Argentina's "queen of letters"; wrote chiefly essays.

Ocantos (*ō-kän'tōs*), **Carlos María** (1860–1949), Argentine novelist L-125

Ocarina (*ŏk-ą-rē'ną*), a simple wind instrument having finger holes and mouthpiece and made of terra cotta or metal; tones soft and hollow; name from *oca* (Italian for "goose") because of similar shape; also called **sweet potato** which it resembles in size and form.

O'Casey, Sean (*shōn*) (born 1884), Irish playwright, born in the slums of Dublin; a laborer, self-taught, he won wide praise for the theatrical skill, keen humor, and merciless realism of his plays, 'Juno and the Paycock' and 'The Plough and the Stars'; also wrote autobiography.

OCEANS AND OTHER BODIES OF WATER IN WORLD

	Area in Sq. Mi.	Mean Depth in Ft.	Maximum Depth in Ft.	Volume in Cu. Mi.
I. OCEANS				
Pacific Ocean	63,801,600	14,052	35,640	169,749,500
Atlantic Ocean	31,830,700	12,874	30,246	77,609,600
Indian Ocean	28,356,200	13,002	26,267	69,821,000
Arctic Ocean	5,440,200	3,954	17,899	4,073,700
Total Oceans	129,428,700			321,253,800
The waters around the Antarctic Continent to the outer limit of icebergs, called by some geographers the Antarctic Ocean, are considered part of the Pacific, Atlantic, and Indian Oceans, and add more than 24,000,000 square miles to their total area. Greatest depth of these waters is 28,152 feet.				
II. SEAS, BAYS, GULFS, ETC.				
Malay Seas	2,248,600	3,401	13,422	1,448,600
Barents Sea	942,600	512	1,803	91,200
South China Sea	895,400	5,419	14,250	920,000
Bering Sea	878,000	4,716	13,032	784,100
Mediterranean Sea	843,000	5,383	15,240	859,000
Caribbean Sea	756,000	8,669	23,748	1,241,500
Gulf of Mexico	618,200	4,874	12,750	570,700
Sea of Okhotsk	589,800	2,748	11,154	306,800
East China Sea	482,300	618	14,250	56,400
Hudson Bay	475,800	420	848	37,900
Sea of Japan	389,100	4,428	12,180	326,500
Andaman Sea	308,000	2,856	14,445	166,500
Yucatan Channel and Gulf of Honduras	293,600	8,708	6,857 16,259	484,400
North Sea	190,000	312	2,172	11,200
Red Sea	169,100	1,500	7,740	48,000
Caspian Sea	168,500	591	3,224	19,000
Baltic Sea (including Kattegat)	163,000	180	1,382	5,500
Black Sea	162,100	4,018	7,382	123,400
Persian Gulf	92,200	200	320	3,500
Gulf of St. Lawrence	91,800	420	1,770	7,200
Aegean Sea	69,100	1,912	7,370	25,100
Gulf of California	62,600	2,670	8,576	31,700
Adriatic Sea	51,000	794	5,200	7,700
Irish Sea	39,900	197	638	1,500
English Channel	29,000	177	566	900
Lake Aral	25,100	52	244	200
Sea of Azov	16,200	33	49	100
Sea of Marmara	3,200	1,027	4,258	600
Total Seas, Bays, Gulfs, etc.	11,053,200			7,579,200
TOTAL FOR THE WORLD	140,481,900			328,833,000

NOTE. The figures for each body of water exclude those of adjoining waters if the latter are named in the table. For example, the figures for the Mediterranean Sea do *not* include the Adriatic Sea or the Aegean Sea; but they *do* include the so-called Ionian Sea and Tyrrhenian Sea which are not listed here. For the waters included in Malay Seas, *see in Index* Malay Seas.

Oc'cam, or Ockham, William of (died 1349), English philosopher and logician; opposed temporal power of papacy; highly important contributions to logic and metaphysics.
Occiden'tal College, at Los Angeles, Calif.; founded 1887 by Presbyterians; now nonsectarian; liberal arts.
Occipital bone, of the cranium S-192, *picture* S-192
Occipital lobe, of brain B-280, 281, *picture* B-279
Occulta'tion, in astronomy E-210
Occupations
Canada, *pictograph* C-66
'Dictionary of Occupational Titles' V-501
United States U-332–3, *pictograph* U-315: industries, *chart* U-322; professions U-332–4. *See also* Fact Summary with each state article; *also in Index* name of each state, *subhead* occupations
vocations. *See in Index* Vocations
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circulation of waters O-332, 335–6
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currents. *See in Index* Ocean currents
depths O-328, *diagrams* A-455, O-328. *See also table* on preceding page
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floods F-146
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hydrographic surveying S-458
icebergs I-8, *pictures* I-8
Indian I-87
lands covered by, in the past O-327
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level: geologic changes G-52, I-6; variations O-336
lighthouses and lightships L-235–8, *pictures* L-236–8
microscopic forms of life O-332
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Pacific P-1–19, *map* P-16–17, *pictures* P-1–3, 9–14, *color pictures* P-5–8
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proportion of earth's surface O-328
sounding devices N-74, O-336
storms S-403–403*a*, *diagrams* S-403–403*a*
sunlight in depths O-330
temperature O-335: how obtained, *picture* O-331
tides T-129–31, *pictures* T-130–1
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circulation O-332, 335–6
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waterspouts W-71
waves W-75–6: erode land E-183–4
winds W-150–5, *diagrams* W-151–5
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Ocean climate, or **marine climate** C-349, E-422, 429, O-332, 335–6
Ocean currents O-332, 335–6, C-349, *maps* O-335–6
Equatorial Currents. *See in Index* Equatorial Currents
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Humboldt, or Peru O-335, 336, *maps* O-335–6
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Labrador A-452, *map* O-335
North Atlantic Current A-452, G-228*b*, O-335, *map* O-335
North Pacific Current W-34, *map* O-336
Ocean Grove, N.J., town on Atlantic 6 mi. s. of Long Branch; pop. 3806; summer pop. 20,000 to 30,000; controlled by Ocean Grove Camp Meeting Association of Methodist church: *map* N-164
Ocean'ia, or **Oceanica,** islands of Pacific Ocean divided into Polynesia, Micronesia, and Melanesia, with New Guinea and Bismarck Archipelago; sometimes Australia and New Zealand included: P-3–9, *map* P-16–17. *See also in Index* chief islands and groups by name
illiteracy P-374
Oceanic bonito, a fish T-205
Oceanides (*ō-sē-ăn'i-dēz*), in Greek mythology, ocean nymphs N-318
Ocean Island, tiny British island possession in Pacific Ocean, s. of equator, between Gilbert Islands and Nauru; seat of government of Gilbert and Ellice Islands Colony; phosphate deposits; area 2 sq. mi.; pop. 2060: *map* P-16
Ocean liner S-152–61
'Flandre', *picture* F-274
model by Norman Bel Geddes, *picture* S-428
Oceanog'raphy, the science of ocean phenomena. *See in Index* Ocean
Oceanography, Scripps Institution of. *See in Index* Scripps Institution of Oceanography
Ocean perch O-337, F-115
Oceanside, Calif., city 12 mi. n.w. of San Diego; pop. 12,881; fruit, vegetables, flowers; 1900-foot pier; airport; Oceanside-Carlsbad College; Camp Pendleton, Marine base, and San Luis Rey Mission nearby: *map* C-35
Ocean Springs, Miss., resort on Bay of Biloxi, inlet of Gulf of Mexico, 3 mi. e. of Biloxi; pop. 3058: *map* M-303
Oceanus (*ō-sē'ą-nŭs*), in Greek mythology, eldest of the Titans, personification of the all-encircling ocean; father of the Oceanides.
Ocean Wave, a game G-8*b*–*c*
Ocelli (*ō-sĕl'ī*), "simple" eyes of insects I-155, *diagram* I-152
Ocelot (*ō'sē-lŏt*), a leopardlike cat L-171, *picture* C-135*b*
Ocher, or **ochre** (*ō'kẽr*), a natural earth or clay found in all parts of the world; color varies from pale to dark yellow, depending upon the amount of coloring matter, hydrated oxide of iron, the clay contains; used as pigment in paint.
Ochs, Adolph Simon (1858–1935), newspaper publisher; born Cincinnati, Ohio, of Jewish parents; rose from newsboy and printer's devil to ownership at 20 of the *Chattanooga Times;* acquired control of *New York Times* 1896; brought both papers from financial difficulties to great prosperity; his policy was to print sound news only, no sensational features.
Ochtman (*ŏkt'măn*), **Leonard** (1854–1934), American painter, born Netherlands; largely self-taught; landscapes noted for atmospheric luminosity and lyrical quality ('Night on the Mianus River').
Ockenheim, Joannes. *See in Index* Okeghem
Ockham, William of. *See in Index* Occam, William of
Ocmulgee (*ŏk-mŭl'gē*) **National Monument,** in Georgia N-38, *map* N-18
Ocmulgee River, rising in n.-central Georgia; flows 260 mi. s.e., joining Oconee River to form Altamaha River: *map* G-76–7
dam at Macon G-79
Ocmulgee National Monument N-38, *map* N-18
O'Connell, Daniel (1775–1847), Irish lawyer and political leader O-337
O'Connell, William Henry, Cardinal (1859–1944), Roman Catholic prelate, born Lowell, Mass.; archbishop of Boston after 1907, cardinal after 1911.
O'Connor, Andrew (1874–1941), sculptor, born Worcester, Mass.; statues and bas-reliefs in marble and bronze (porch of St. Bartholomew's Church, New York City; statue of Abraham Lincoln at Springfield, Ill.).
O'Connor, Basil (born 1892), lawyer and humanitarian, born Taunton, Mass.; law partner of F. D. Roosevelt 1925–33; president National Foundation for Infantile Paralysis from 1938; chairman American Red Cross 1944–49.
O'Connor, Thomas Power (Tay Pay) (1848–1929), Irish political leader and journalist, active in the cause of Irish nationalism; called "father of the House of Commons," of which he was a member for 49 years; founded and edited *T. P.'s Weekly.*
Ocotillo (*ō-kō-tēl'yō*), a shrub (*Fouquieria splendens*) having numerous slender, spiny branches, scalelike leaves, and clusters of flame-red flowers; common in desert areas of s.w. United States and Mexico; also called coach-whip cactus, Jacob's staff, candle flower: *color picture* P-290
Octane, a hydrocarbon (C_8H_{18}). *See also in Index* Paraffin series
antiknock test for gasoline G-33
Octant, instrument for measuring angles, similar to sextant but having arc one eighth of circle; used especially in aircraft navigation; often popularly called sextant: A-94–5, N-77, *picture* A-433. *See also in Index* Sextant
Octave (*ŏk'tăv*), interval and note in music M-468*b*. *See also in Index* Music, *table* of musical terms and *forms*
Octavia (*ŏk-tā'vi-ą*) (died 11 B.C.), sister of Roman emperor Augustus; wife of Mark Antony; deserted by him for Cleopatra: C-343
Octavia (A.D. 42–62), Roman empress, wife of Nero; divorced by him in

favor of Poppaea Sabina; banished to island of Pandataria on false charge of unfaithfulness and there murdered.
Octavian, Octavianus, or Octavius, Gaius Julius Caesar. *See in Index* Augustus
Octa'vo, a book size B-239
October O-337
birthdays of famous persons. *See in Index* Birthdays, *table*
birthstone, *color picture* J-348
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Octobrist Revolution, Russia (1917) R-289
Octom'eter, line in poetry P-335
Oc'topus O-338–9, 337, M-333, *pictures* O-339, P-106
eggs O-338, *picture* O-339
in aquarium O-338, *picture* A-281
Ocular. *See in Index* Eyepiece
Oculist (*ŏk'ū-lĭst*), or **ophthalmologist** (*ŏf-thăl-mŏl'ō-jĭst*), a physician who specializes in the eye and its diseases S-330
Odd Fellows, Independent Order of, an international, secret, fraternal, beneficiary society founded in England about 1745; Thomas Wildey, who organized a lodge in Baltimore in 1819, considered founder of American order; Rebekah degree for women established 1851; distinctive feature of order is care for sick, distressed, and dependent members and their families.
Ode (*ōd*), a form of stately and elaborate lyric poetry; originally a poem intended to be chanted or sung: P-337
Dryden D-157
Horace L-131
Keats K-19
Pindar G-210
Odell, William Franklin (1774–1844), Canadian statesman, born Burlington, N.J.; provincial secretary of New Brunswick 1812–44, succeeding his father, Jonathan Odell, who held the office 1784–1812.
Odena'thus (died A.D. 267 or 271), general and ruler of Palmyra P-50
Odense (*ō'dĕn-sŭ*), 3d city in Denmark, on island of Fünen at mouth of Odense River; named for Norse god Odin; pop. 100,940; splendid cathedral; industrial and commercial center: *maps* D-71, E-424
'Ode on a Grecian Urn', poem by Keats K-19
Oder (*ō'dĕr*), Czech **Odra** (*ō'drà*), important river of Czechoslovakia, Poland, and e. German border; rises in Moravia, flows n.w. 560 mi. and enters Baltic Sea by 3 arms after widening to form Stettiner Haff; cities on river include Breslau, Frankfort-on-the-Oder, Stettin: *maps* E-416, 419, G-88
Odes'sa, Russia, seaport of the Ukrainian Soviet Socialist Republic on Black Sea; pop. 600,000: O-340, *maps* R-267, B-204, E-417
Odessa, Tex., city 237 mi. s.w. of Amarillo; pop. 29,495; oil and gas fields; oil-field supply center; ranching; business college and Odessa Junior College: *map* T-90
Odessus, Bulgaria. *See in Index* Varna
Odets (*ō-dĕts'*), **Clifford** (born 1906), playwright, born Philadelphia, Pa.; (plays: 'Awake and Sing', 'Paradise Lost', and 'The Flowering Peach' depict Jewish family life; 'Waiting for Lefty' is about taxi-drivers' strike; 'Golden Boy', a violinist turned prize fighter; 'The Country Girl', the long-suffering wife of a drunken actor).
Odin (*ō'dĭn*), also **Woden,** or **Wotan,** in Norse mythology, father of the gods O-340–1, M-476*d*, *picture* O-341
in 'Nibelungenlied' N-232
ODM (Office of Defense Mobilization), U. S. U-358
O'do, French **Eudes** (*ûd*) (died A.D. 898), king of the Franks, crowned 888 after deposition of Charles the Fat; son of Robert the Strong; fought Normans and his rival Charles III for French throne.
Odoacer (*ō-dō-ā'sẽr*) (434?–493), German leader who seized power in Italy, deposed Romulus Augustulus, and thus overthrew the Western Roman Empire in 476: M-236
Odom, William (Bill) (1920–1949), aviator, born Columbus, Miss.; established round-the-world solo flight speed record of 73 hours 5 minutes in Aug. 1947; set nonstop distance record for light aircraft in March 1949. Killed Sept. 1949 at Cleveland, Ohio, in air-race crash.
Odometer, for measuring distance traveled D-29, *diagram* S-334, *picture* D-29
Odonata (*ō-dō-nā'tą*), an order of insects I-160*a*
O'Donnell, Peadar (born 1896), Irish novelist; writes sympathetically and discerningly of Irish peasants; suffered period of imprisonment for revolutionary activities ('Storm'; 'The Way It Was with Them'; 'There Will Be Fighting').
O'Donnell family, an ancient Irish family; **Hugh Roe O'Donnell** (1571?–1602), fought with Hugh O'Neill against British rule; with defeat in 1601 fled from the country; his brother **Rory O'Donnell** (1575–1608), 1st earl of Tyrconnel, fled in "flight of the earls": I-231. *See also in Index* O'Neill family
Odontoid process S-192
Odontolite (*ō-dŏn'tō-lĭt*), a variety of fossil bone or tooth colored blue by iron phosphate, sometimes called fossil or bone turquoise; used as gem stone.
Odor, a scent S-200, N-305
O'Dowd, Bernard (Patrick) (1866–1953), Australian poet and lawyer, born Beaufort, Victoria, Australia; verse has strong national flavor (poem, 'The Bush').
Odra River, central Europe. *See in Index* Oder
Odysseus (*ō-dĭs'ūs*), in Greek mythology, king of Ithaca and Trojan War hero O-342–5, *pictures* O-342–4
Achilles called to war A-8
Aeolus aids A-29–30
Ajax contends with A-111
Circe C-309
Cyclops C-533
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Homer's 'Odyssey' H-415
wooden horse of T-191–2
'Odyssey' (*ŏd'i-sĭ*), Greek epic poem relating adventures of Odysseus on return from Trojan War H-415, O-342–5, M-477, L-98*b*. *See also in Index* Homer
influence on Latin literature L-130
place in Greek literature G-209
Oea, ancient name of Tripoli, a city in Libya L-219
Oedipus (*ĕd'i-pŭs*), in Greek mythology, king of Thebes, whose tragic fate formed subject of many dramas O-345, *picture* G-209
answers riddle of Sphinx R-153
'Oedipus', musical composition by John Knowles Paine M-466
Oedipus complex, in psychology P-425
OEEC. *See in Index* Organization for European Economic Co-operation
Oehlenschlager, Adam. *See in Index* Ohlenschläger
Oenone (*ē-nō'nĭ*), in Greek mythology, a river nymph of Mount Ida, wife of Paris; story told in Tennyson's 'Oenone'
Paris deserts P-80
Oenothera. *See in Index* Evening primrose
Oerlikon gun, *picture* M-10
Oersted (*ûr'stĕd*), or **Orsted, Hans Christian** (1777–1851), Danish physicist; established connection between electricity and magnetism: E-303, 308, *picture* E-307
isolated aluminum A-183
OES (Office of Economic Stabilization), U. S. R-215
Oesophagus. *See in Index* Esophagus
Oesterreich. *See in Index* österreich
'Oesterreichische Bundeshymne' (*û'stĕr-rĭĸ-i-shĕ bųn'dēs-hĭm-nĕ*), Austrian national hymn N-41
O'Faolain, Sean (*shôn*) (born 1900), Irish author, born Dublin; charter member Irish Royal Academy of Letters; early writings in Gaelic (novels: 'A Nest of Simple Folk', 'Come Back to Erin'; nonfiction: 'Life Story of Eamon De Valera,' 'King of the Beggers'—a life of Daniel O'Connell, 'The Irish: a Character Study').
Of'fa (died 796), king of Mercia; defeated Wessex and the Welsh, wresting part of his land from the latter and building great fortifications ("Offa's Dyke") along entire border between England and Wales
gold coin, *pictures* M-340
Offenbach (*ôf'ĕn-bäĸ*), **Jacques** (1819–80), composer, born Cologne, Germany; lived in Paris from boyhood; began as 'cellist at L'Opéra Comique; later conducted at Théâtre Français; in 1855 opened own theater, Bouffes-Parisiens: O-396
story of 'Tales of Hoffmann' O-393
Office, as applied to units or parts of the United States government. *See in Index* office by name, as Civilian Defense, Office of
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Officers of U. S. Coast Guard C-371
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Naval Academy N-70–1
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Offset process, in lithography L-276, P-210*d*
O'Flaherty, Liam (born 1897), Irish writer; studied for priesthood in youth; novels and short stories are vivid and realistic, reflecting the author's life during Irish Rebellion ('Famine'; 'The Informer').
Ogasawara Jima, in Pacific Ocean. *See in Index* Bonin Islands
Ogburn, William Fielding (born 1886), sociologist and educator, born Butler, Ga.; professor of sociology, University of Chicago, 1927–51; work on federal boards for social and economic planning ('American Marriage and Family Relationships'; 'You and Machines'; 'Social Characteristics of Cities').

Ogdai Khan (died 1241), Mongol emperor M-345
Ogden, Peter Skene (1794–1854), British-American fur trader; cultured, resourceful, widely known and respected among Indians; during 33 years' service with Hudson's Bay Company in Northwest explored much territory and became head of Columbia River district; Ogden, Utah, named for him.
Ogden, Utah, industrial city in agricultural region, 32 mi. n. of Salt Lake City on Weber and Ogden rivers; pop. 57,112; Weber College; military bases adjacent: U-409, *maps* U-416, U-252
Ogdensburg, N.Y., port on St. Lawrence River, at foot deep-water navigation of Great Lakes; pop. 16,166; trade in grain and coal; newsprint paper, window shade rollers, brass goods: *maps* N-205, U-253
Ogdensburg Agreement (1940), between U.S. and Canada C-103
Ogeechee (*ō-gē'chē*) **River**, in Georgia, 250 mi. to Ossabaw Sound, *maps* G-70, 76–7
Ogier (*ō'gĭ-ēr*), **the Dane**, hero of romance, figuring in literature of several countries; was hostage for his father Godfrey, duke of Denmark, at court of Charlemagne.
Ogilvy, Margaret, mother of James M. Barrie B-60
Ogive (*ō'jīv*), a graph G-164, *graph* G-164
Oglala (*ō-glä'lä*), a tribe of the Teton Sioux Indians living chiefly in South Dakota; some in North Dakota.
Oglethorpe (*ō'gl-thôrp*), **James Edward** (1696–1785), English general and philanthropist, founder of Georgia O-346, G-79, *picture* O-346
  Augusta, Ga. A-472
  Fort Frederica National Monument N-33, *map* N-18
  prohibits importation of liquor into Georgia P-416
  Savannah S-51
Oglethorpe Day (February 12) F-56
Oglethorpe University, at Oglethorpe, Ga., near Atlanta; founded 1835; re-established 1912; arts and sciences, business, citizenship, community service, fine arts, human understanding, science
  Crypt of Civilization A-451
OGPU, name given to the Soviet secret police 1923–34; name from initials of words meaning Special Government Political Administration; functions taken over by NKVD (secret police): R-282, 290
Ogygia (*ō-gĭj'ĭ-ą*), in Greek mythology, the island of Calypso O-344
O'Hara, John Henry (born 1905), writer, born Pottsville, Pa.; style simple and direct; contributor to *New Yorker* and other magazines ('Pal Joey', night-life sketches; 'Appointment in Samarra' and 'A Rage to Live', novels).
O'Hara, Mary, pen name of Mary Alsop Sture-Vasa (born 1885), author, born Cape May Point, N. J.; Remount Ranch, Granite Canyon, Wyo., is background for her books ('My Friend Flicka'; 'Thunderhead'; 'Green Grass of Wyoming'); also writer for motion pictures.
O. Henry, pen name of William Sydney Porter (1862–1910), American short-story writer P-375–6
O'Higgins, Bernardo (1778?–1842), Chilean patriot and dictator, leader in war for independence O-346, C-256, *picture* O-346
  flag, Chile F-138, *color picture* F-136
Ohio, a n.-central state of U. S.; 41,222 sq. mi.; pop. 7,946,627; cap. Columbus: O-347–62, *maps* O-356–7, 353, U-253, 265, 275, 287, *pictures* O-347, 349–50, 360–1
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  Mound Builders in M-438–9
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Ohio and Erie Canal, between Portsmouth and Cleveland, Ohio O-348, *map* C-108
Ohio buckeye B-337, *picture* B-337
Ohio Company of Associates, company formed by New England colonists (1786) for purchase and settlement of western lands; large tracts in s. Ohio purchased from Congress
  Marietta founded (1788) O-362
Ohio River O-362–3, *maps* O-348, K-23, N-245, U-253, 274–5
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  commerce: of Ohio O-348, 350, 362; of Pennsylvania P-276
  Falls, at Louisville, Ky. L-335, O-363
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Ohio State University, at Columbus, Ohio; state control; founded 1870; colleges of agriculture, arts and sciences, commerce and administration, dentistry, education, engineering, law, medicine, pharmacy, veterinary medicine; graduate school: C-419, *picture* O-350
Ohio University, at Athens, Ohio, with branches at Chillicothe, Portsmouth, and Zanesville, Ohio; state control; chartered 1804; opened 1809; arts and sciences, commerce, education, engineering, fine arts, home economics; graduate college.
Ohio Wesleyan University, at Delaware, Ohio; Methodist; opened 1844 (chartered 1842); liberal arts, fine arts, music; graduate studies.
Ohlenschläger, or Oehlenschlager (*ū-lŭn-shlä'gĕr*), **Adam Gottlob** (1779–1850), Danish poet and dramatist of wide influence; a pioneer of romantic movement in Europe; fluent, profuse style ('Hakon Jarl'; 'Aladdin's Lampe').
Ohm (*ōm*), **Georg Simon** (1787–1854), German mathematician and physicist; ohm, unit of electrical resistance, named for him; also Ohm's law.
Ohm, unit of electrical resistance E-298
Ohm's law, for measuring electric current E-298, 299, *diagrams* E-299, 300
  Cavendish anticipates discovery E-308
  modified for alternating current E-306
Oil and Gas, Division of, U. S. Department of the Interior U-363
Oil beetles, group of blister beetles, subfamily *Meloinae*, that give off a disagreeable, oily fluid when disturbed, *picture* B-105
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Oil-burning ships S-156
Oil cake, seeds from which oil has been pressed F-45
  corn C-484, *diagram* C-483
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Oil City, Pa., on Allegheny River about 60 mi. s.e. of Erie, one of largest oil markets of Pennsylvania petroleum fields; pop. 19,581: *maps* P-132, P-180, U-253
Oilcloth, how made L-255
Oildale, Calif., in Kern County, one mi. n.w. of Bakersfield; pop. 16,615; oil fields; refineries; airport: *map C-35*
Oil heating
  burner H-322, *picture* H-322
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sperm oil W-114
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water and oil, why they do not mix S-235, *diagram* S-234
waterproof property F-44
whale oil W-114
Oilstone, smooth rock used for sharpening tools; often used with oil
Arkansas produces A-360
Oil wells. *See in Index* Petroleum, *subhead* wells
Oirot, also **Oirat**, U.S.S.R., an autonomous region of R.S.F.S.R. in Altai Mountain region of w. Siberia; 91,200 sq. mi.; inhabited by Oirots, a nomadic Asiatic people, and Russians; stock raising and hunting: *map* R-260
Oise (*wäz*) **River**, in n. France; rises in s.w. Belgium; flows s.w. receiving Aisne at Compiègne, and joins Seine 15 mi. n.w. of Paris; length 187 mi.; strategic line in World Wars I and II: *map* F-259
Oisin. *See in Index* Ossian
Oiticica (*oi-tĭ-sē'ką*) **oil** P-40
Ojeda (*ō-hä'dä*), **Alonzo de** (1465?–1515), Spanish explorer; accompanied Columbus on his second voyage, 1493; founded colony on Gulf of Darien, 1509
names Venezuela V-442
Ojib'wa, or **Chippewa** (*chĭp'ĕ-wä*), Indian tribe that lives in Minnesota, Wisconsin, Michigan, North Dakota, Montana, and in Ontario, Canada, *map* I-106*f*, *table* I-108
wigwam, *picture* I-99
Oka. *See in Index* Trappist cheese
Okana'gan, Lake, in s. British Columbia, Canada, 60 mi. long, *maps* C-68, 80
Okanogan River, or **Okanagan River**, a tributary of the Columbia in British Columbia, Canada, and Washington, rising in Lake Okawogus; 300 mi. long: *maps* C-80, W-37
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Okapi (*ō-kä'pi*), a relative of the giraffe G-112, *picture* G-112
price paid for by zoos Z-358
Oka (*ō-kä'*) **River**, navigable river in central Russia; 1000 mi.; receives Moscow River s. of Moscow; joins Volga at Gorky: *map* E-417, *picture* R-258
Okeecho'bee, Lake, in Florida, 40 mi. long, 25 mi. wide F-163, *maps* F-151, 159, U-277
O'Keeffe, Georgia (Mrs. Alfred Stieglitz) (born 1887), painter, born Sun Prairie, Wis.; noted for her work in abstract design, also for unique fashion in which she paints flowers.
Okefenokee (*ō-kē-fi-nō'kē*) **Swamp**, in Georgia and Florida G-70, *maps* G-70, 77, F-158, U-277
Okeghem (*ō'kē-gĕm*), **Joannes**, also **Ockenheim** (1430?–95?), Flemish composer of church music, and a music teacher of great influence; his pupils were founders of schools of music in many parts of Europe.
O'Kelly, Sean (*shôn*) (born 1882), Irish newspaper publisher and statesman; a founder of Sinn Fein; member of Dail Eireann after 1927; elected president of Eire (now Republic of Ireland) 1945, re-elected 1952.
Okhotsk (*ō-kŏtsk'*, Russian *ō-кôtsk'*), **Sea of**, large inlet of Pacific indenting e. coast of Siberia: *maps* R-259, A-406, 411. *See also in Index* Ocean, *table*
fur seals of Robben Island S-89
Okhotsk Current, or **Oyashio** (Japanese for "parent stream"), a cold current which flows s. from Sea of Okhotsk dividing into two branches, one flowing toward mainland of Asia, the other along e. coast of Japan
effect on Japan J-296, *map* O-336
Okinawa (*ō'kĭ-nä'wą*), largest island of Ryukyu chain, about 60 mi. long, 2 to 20 mi. wide; pop. 517,634; strategic air and naval base; with nearby islets known as Okinawa Gunto (Okinawa "cluster of islands"); total pop. 579,791: *maps* P-16, J-297, *picture* P-19
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Oklahoma (*ō-klą-hō'mą*), state of s.-central U.S.; 69,919 sq. mi.; pop. 2,233,351; cap. Oklahoma City: O-363–76, *maps* O-370–1, 364, 367, U-252–3, 274, 278–9, *pictures* O-363–4, 368, 373–6
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'Oklahoma!' an American light opera O-398, *picture* O-397
Oklahoma, University of, at Norman, Okla.; state control; founded 1892; colleges of arts and sciences, business administration, education, engineering, fine arts, law, pharmacy; graduate school; schools of medicine and nursing at Oklahoma City: *picture* O-374
Oklahoma Agricultural and Mechanical College, at Stillwater, Okla.; state control; founded 1891; arts and sciences, agriculture, commerce, education, engineering, home economics, veterinary medicine; graduate school; technical training at Okmulgee.
Oklahoma Baptist University, at Shawnee, Okla.; controlled by Southern Baptist Convention; opened 1911; arts and sciences, education, music.
Oklahoma City, Okla., state capital, w. center of state, on Canadian River; pop. 243,504: O-376–7, *maps* O-370–1, U-252, *picture* O-376
Capitol, State, *picture* O-364
Oklahoma City University, at Oklahoma City, Okla.; Methodist; founded 1904; arts and sciences, business, law, music.
Oklahoma College for Women, at Chickasha, Okla.; state control; founded 1908; arts and sciences, fine arts.
Okmul'gee, Okla., city 37 mi. s. of Tulsa, in coal, oil, and cotton region; pop. 18,317; glass products, oil refining, food processing; Oklahoma A. & M. College School of Technical Training; capital of Creek Nation 1868–1907: *maps* O-371, U-253
O'kra, or **gumbo**, a plant O-377, *picture* O-377
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Okubo (*ō'kų-bō*), **Toshimitsu** (1830–78), one of 5 Japanese nobles who led revolution (1868) against shogunate; one of emperor's advisers.
Okuma (*ō'kų-mä*), **Shigenobu, Marquis** (1838–1922), Japanese statesman, early advocate of abolition of feudal system and advance reforms; founded schools; premier during first half of World War I.
Olaf (*ō'läf*) **II, Saint** (995–1030), king and patron saint of Norway, conquered throne 1016; unified kingdom and continued its Christianization
festival day F-59
Olaf Tryggvesson (969–1000), king of Norway; began Christianization of Norway; leaped into sea after defeat by Danes and Swedes; hero of Longfellow's 'Saga of King Olaf': E-391, N-296*b*
Öland (*ú'länd*), an island of Sweden, near its s.e. extremity, in the Baltic Sea, separated from the mainland by Kalmar Sound; 519 sq. mi.; pop. 26,230; cap. Borgholm on w. coast: *maps* N-301, E-424
Olcott, Frances Jenkins, American librarian and writer, born Paris, France (father at that time in U. S. consular service); author and editor of folklore and fairy tales for children and books on children's reading ('The Children's Reading'; 'Tales of the Persian Genii').
'Old Abe, the War Eagle', story E-168
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Old-age benefits, stated allowances paid regularly to persons who have reached a certain age; established in United States, England, Aus-

tralia, New Zealand, and other countries: P-141, S-218–218*a*
Old Bay State, or Bay State, popular name for Massachusetts.
Oldberg, Arne (born 1874), composer and teacher of music; born Youngstown, Ohio.
Old Bet, elephant, called "mother of the American circus" C-311
'Old Black Joe', song by Stephen C. Foster M-466
Old Blood and Guts, nickname of Gen. George S. Patton, Jr. P-99
Old Castile, Spain, n. part of Castile, an elevated plateau walled in by mountains.
Old Catholic churches, religious bodies adhering to dogma and customs of Roman Catholic church but not accepting authority of its hierarchy; groups in U. S. are outgrowths of Old Catholic movement and churches of Europe. For membership, *see in Index* Religion, *table*
'Old Curiosity Shop', novel by Charles Dickens telling the story of an old curiosity-shop keeper and his granddaughter, Little Nell: D-83, *picture* D-84*a*
Old Dominion, popular name for Virginia
origin of name V-477, 489
Olden Barneveldt. *See in Index* Barneveldt
Oldenburg (*ōld'ĕn-bŭrĸ*), former state of n.w. Germany on North Sea; 2480 sq. mi.; pop. 500,000; after World War II, included in Lower Saxony: P-424*a*, *maps* G-88, E-424
Old English language and literature. *See in Index* Anglo-Saxon language and literature
Old English sheep dog, *color picture* D-116*a*, *table* D-118*b*
Old Faithful, geyser in Yellowstone National Park Y-337, *maps* Y-338, *picture* Y-339
Oldfield goldenrod G-135
Oldfield pine, a common name sometimes applied to the loblolly pine.
'Old Folks at Home', song by Stephen C. Foster F-248, M-466
Old Forge, Pa., coal-mining borough on Lackawanna River, 4 mi. s.w. of Scranton; pop. 9749: *map* P-133
Old Fuss and Feathers, nickname of Gen. Winfield Scott S-69
Old Glory, name given to U. S. flag.
Old Granary Burial Ground, in Boston, Mass. B-258
Old Guard, popular name of noted body of troops in army of Napoleon I; made last French charge at battle of Waterloo.
Oldham (*ōld'ŭm*), England, important cotton manufacturing town in Lancashire 6 mi. n.e. of Manchester; pop. 121,212; coal: *map* B-325
Old Hickory, nickname of Andrew Jackson J-285
Old Ironsides. *See in Index* 'Constitution'
'Old Ironsides', poem by Oliver Wendell Holmes H-408, A-226*e*
Old Kasaan National Monument, on Prince of Wales Island, Alaska N-38, *map* N-18
'Old Kentucky Home, My', famous American plantation song; words and music written by Stephen C. Foster in 1850: F-248
Bardstown shrine, *picture* K-34
Old King, horse, foundation sire of Albino Horse, *table* H-428*e*
'Old King Cole', origin M-406
Old Lady of Threadneedle Street, popular name for the Bank of England L-301
Old Line State, popular name for Maryland.
Old Man Eloquent, nickname of John Quincy Adams A-16
Old Man of the Mountain, head of the Assassins A-425
Old Man of the Mountain, New Hampshire N-143, *picture* N-143
Old Man of the Sea, in 'Arabian Nights', the little old man who begs Sinbad the Sailor to carry him across a brook and then will not be dislodged from his back; hence, a bore or burden: A-293
Old Manse, in Concord, Mass., home of Emerson and Hawthorne C-430
Old moon M-386, *diagram* M-385
"Old Moon in the new moon's arms" M-386, 389
'Old Mortality', novel by Sir Walter Scott telling of the struggles of the Scottish Covenanters with the royal forces under Claverhouse; title is taken from the nickname of old Robert Paterson who kept the gravestones of the Covenanters in repair
Buchan quoted on S-69
'Old Mother Hubbard' M-406
Old North Church (Christ Church), Boston B-260, *picture* B-259
Old North State, popular name sometimes applied to North Carolina.
Old Point Comfort, Va., summer resort at mouth of James River, 14 mi. n. of Norfolk; Fort Monroe is here.
Old Pretender (James Francis Edward Stuart) (1688–1766) P-410
Old public functionary (Buchanan) B-335
Old Regime (*rā-zhēm'*), the despotic, oppressive government of France before the Revolution (1789).
Old Rough and Ready, nickname of Zachary Taylor T-27
Olds, Elizabeth (born 1897), artist and author, born Minneapolis, Minn.; studied art in Paris; received Guggenheim Fellowship for her paintings of circus horses and trapeze artists. Wrote and illustrated the following books for children: 'Big Fire'; 'Riding the Rails'; 'Feather Mountain'.
Olds, Ransom Eli (1864–1950), pioneer automobile builder, born Geneva, Ohio; built a 3-wheeled steam carriage 1887, a 4-wheeled steam car 1893, a gasoline car (Oldsmobile) 1896: *table* A-505
Oldsmobile, *picture* A-506
Old Salamander, nickname of David Glasgow Farragut F-37
Old Sarum, (*sā'rŭm*), parish in Wiltshire, England, 2 mi. n. of Salisbury; former city, although almost entirely deserted by 16th century, sent members to Parliament until 1832; proverbial "rotten borough" sends Chatham to Parliament C-198
Old Saybrook, Conn., town on Connecticut River near mouth; pop. of township, 2499; settled by English 1635; united with Connecticut 1644; early home of Yale University: *map* C-445
Old South Meeting House, Boston, Mass., B-260, *picture* B-259. *See also in Index* New Old South Church
Old Spanish Trail U-409, *map* R-159
Old squaw, a diving duck (*Clangula hyemalis*) D-160
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Old Testament, a division of the Bible B-134, 136. *See also in Index* Bible divisions P-419
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Prophets P-418–19, *picture* P-419
Old Tippecanoe, nickname of William Henry Harrison H-278
Old wives' tale, odd tale, belief, or traditional superstition
about children C-239
'Old Wives' Tale, The', by Arnold Bennett, story of two sisters in the pottery-manufacturing section of Staffordshire, England; also title of English comedy by George Peele.
Oleaceae (*ō-lē-ā'sē-ē*), the olive family, a group of trees and shrubs distributed over temperate and tropical regions; includes ash and olive trees, and lilac, fringe tree, privet, forsythia, and jasmine.
Olean (*ō-lē-ăn'*), N.Y., distributing point for Pennsylvania petroleum; on Allegheny River 60 mi. s. of Buffalo; pop. 22,884; oil-well machinery, glass, leather, tile: *map* N-204
Olean'der, a flowering shrub O-377, *picture* O-377
Oleg, early ruler of Russia R-284
Ole'ic acid, a fatty acid F-45
Olein (*ō'lē-in*), compound found in fats and oils F-45
Oleomargarine (*ō-lē-ō-mär'ĝą-rēn* or *ō-lē-ō-mär'ĝą-rĭn*), or **margarine,** butter substitute O-377–8
tallow or oleo stock in F-45
Oleo stearin F-45
Oléron (*ō-lā-rôn'*), fertile island off w. coast of France at mouth of Charente River; included in department of Charente-Inférieure; 66 sq. mi.; chief town St. Pierre: *maps* F-259, E-425
Oleum, or fuming sulfuric acid S-448
Olfactory nerve, the nerve of smell; branches are distributed to mucous membrane of nasal cavity.
Olga, known as St. Olga, ruler of Russia A.D. 945–955 R-284
Olibanum. *See in Index* Frankincense
Olier de Verneuil, Jean Jacques (1608–57), French Roman Catholic prelate, born Paris, France; helped to establish Sulpician settlement at Montreal in 1640.
Oligarchy (*ŏl'i-ĝär-kĭ*), a form of government G-146
ancient Greece D-63
Venice V-446
Ol'igocene epoch, in geology, *diagram* G-58, *table* G-57
Ol'igoclase, a mineral containing sodium and calcium silicates M-266
Oliphant (*ŏl'i-fănt*), **Laurence** (1829–88), Scottish writer and mystic, born Capetown, South Africa; books reflect life of adventure and travel ('A Journey to Katmandu', travel; 'Piccadilly', novel; 'Episodes in a Life of Adventure', autobiography).
Oliphant, Margaret Wilson (1828–97), Scottish novelist and historical writer ('Chronicles of Carringford'; 'Makers of Venice').
Oliphant, or horn, of Roland R-178
Olive, a small evergreen tree O-378–9, *pictures* O-378, *color picture* P-288
groves: Corfu, *picture* G-191
packing, California, *picture* C-42
sacred tree of Hercules O-381
stuffed P-143
Olive family. *See in Index* Oleaceae
Olivene, a mineral R-169
Olive oil O-378, 379, F-45
freezing point, *table* F-284
Oliver, George. *See in Index* Onions, Oliver
Oliver Optic. *See in Index* Optic, Oliver
'Oliver Twist', novel by Charles Dickens; relates adventures of orphan who infringes workhouse etiquette by asking for more gruel; runs away and becomes innocent

pupil of Fagin the pickpocket and tool of Bill Sikes the burglar: *picture* E-380*b*
Bill Sikes, *picture* D-85

Olives, Mount of, historic ridge e. of Jerusalem; favorite resort of Christ and Disciples; contains Hill of Offense, reputed scene of Solomon's idolatry; alluded to in Old and New Testaments: J-336, *map* J-336, *picture* J-337

Olive shell
lettered olive (*Oliva sayana*), snail: shell, *color picture* S-139*a*

Oliv'ia, countess beloved by the duke in Shakespeare's 'Twelfth Night'.

Olivier (*ō-liv'i-ā*), **Sir Laurence** (born 1907), English actor, director, and producer; knighted 1947 for services to stage and to motion pictures; produced, directed, and played title roles in the films 'Henry V' (released in U.S. 1946) and 'Hamlet'; won Academy award for 1948 for his role in 'Hamlet'; this film, in turn, won Academy award as best picture of 1948.

Olivine (*ŏl'i-vēn*), *also* **chrysolite,** *or* **peridot,** a semiprecious stone J-350, M-266
birthstone, *color picture* J-348
sand S-38

Ollivant, Alfred (1874–1927), English novelist; known particularly for 'Bob, Son of Battle' (published in England as 'Owd Bob'), the story of two sheep dogs. Bob and his lifelong enemy Red Wullie, both suspected of killing sheep.

Olmecs, ancient race of Indians
statue, *picture* I-110

Olmedo (*ōl-mā'dō*), **José Joaquín de** (1780–1847), poet of Ecuador L-127, *picture* L-125

Olmsted (*ōm'stĕd*), **Frederick Law** (1822–1903), pioneer landscape architect, born Hartford, Conn.; designer of Central Park, New York City, Fairmont Park, Philadelphia, and Franklin Park, Boston; originator of school of landscape gardening which emphasizes natural features, avoiding formal European styles: P-86*a*

Olmütz, Czechoslovakia. *See in Index* Olomouc

Olney, Richard (1835–1917), jurist and statesman, born Oxford, Mass.; attorney general (1893–95) and secretary of state (1895–97) under President Cleveland; used injunction in railroad strike of 1894, first case of court injunction in strike.

Olomouc (*ō'lō-mōts*), German **Olmütz** (*ōl'mütz*), Czechoslovakia, town in Moravia on Morava River; coal mining; *pop.* 58,178; occupied by Swedes in Thirty Years' War; besieged by Frederick II of Prussia (1758); conference to settle Austro-Prussian conflict over German affairs (1850): *maps* C-535, E-425

Olszewska (*ōl-shĕv'skä*), **Maria** (born 1892), German contralto; sang in opera and concert in Europe and South America; American debut, Chicago, 1930.

Olsztyn (*ōlsh'tin*), German **Allenstein** (*äl'ĕn-shtīn*), Poland, former German (East Prussian) town in Masurian Lakes region; pop. 29,053; in Poland since 1945: *map* E-424

Olustee, Fla., village 46 mi. s.w. of Jacksonville; battle of Olustee or Ocean Pond (Feb. 20, 1864), one of the bloodiest battles of the Civil War, resulting in defeat for the Federal forces: *maps* F-158, C-334

Olym'pia, Greece, plain in ancient Elis on Alpheus River (modern Ruphia); adorned by beautiful temples and statues; scene of Olympic Games: O-381, *map* G-197
Praxiteles' 'Hermes with the Infant Dionysus' G-204–5, S-77, *picture* S-77
temple and statue of Zeus S-105, *picture* S-106

Olympia, Wash., state capital, at head of Puget Sound; *pop.* 15,819: O-379, *maps* W-44, U-252, *picture* W-34
Capitol, State, *pictures* W-34, 38

Olym'piad, formerly the interval of four years between celebrations of Olympic Games; in modern usage signifies the Olympic Games: O-381

Olympian gods, the gods and goddesses of Greek mythology who were supposed to live on Mount Olympus: Zeus, Apollo, Hermes, Poseidon, Ares, Hephaestus, Hades, Hera, Athena, Hestia, Aphrodite, and Artemis.

Olympia oyster O-436

Olympias (died 316 B.C.), fierce, ambitious Epirote princess, wife of Philip II of Macedon A-148

Olympic Games, ancient and modern O-379–82, *pictures* O-379–81
field sports T-163
Marathon race M-92
modern sites O-381

Olympic Mountains, in n.w. Washington, part of Coast Range, between Puget Sound and Pacific W-34, *maps* W-44, U-307, *picture* W-35
national park N-38, *maps* W-44, N-18

Olympic National Park, in Washington N-38, *maps* W-44, N-18

Olympic register, Greeks reckoned time by C-23

Olym'pus, Mount, ridge in n. Greece, separating Thessaly and Macedonia; about 10,000 ft. above sea level: G-189, *maps* G-189, 197
fabled home of gods Z-350, M-476*a*

Olympus, Mount, in Olympic National Park, Washington N-38

Omaha, tribe of Siouan Indians formerly living between Platte and Niobrara rivers in Nebraska O-382

Omaha (*ō'mą-hą*), Neb., largest city of state, on Missouri River; pop. 251,117: O-382, *maps* N-103, U-253, *pictures* O-382
East Omaha Bridge. *See in Index* Bridge, *table*

Omaha, Municipal University of, at Omaha, Neb.; city control; founded 1908; arts and sciences, adult education, applied arts and sciences, business administration, education.

Oman (*ō-män'*), independent state of s.e. Arabia on Persian Gulf, Gulf of Oman, and Arabian Sea; 82,000 sq. mi.; pop. 830,000, chiefly Arabs; cap. Muscat: A-284, *maps* A-285, A-407
flag F-137, *color picture* F-135
natural features and climate A-285
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relationships in continent, *maps* A-406–7, 411–12

Oman, Gulf of, arm of Arabian Sea s. of Iran; connected with Persian Gulf by Strait of Ormuz: *maps* A-285, A-407

Omar (*ō'mär*) (581?–644), 2d Mohammedan caliph, organizer of Mohammedan power from warring sect to conquering nation and empire
in Egypt C-15

Omar, Mosque of, Jerusalem. *See in Index* Dome of the Rock

Omar Khayyam (*ki-yäm'*) (1050?–1123?), Persian mathematician, astronomer, and poet P-158

Oma'sum, or **manyplies,** third stomach of ruminants R-254

Omayyads. *See in Index* Ommiads

Ombu, evergreen tree (*Phytolacca dioica*) of pokeweed family, native to river courses of pampas of South America. Grows to 60 ft.; thick trunk; spreading, flat crown; leaves oval, smooth; flowers white, in clusters. Sometimes called umbú, and "bella sombra."

Omdurman (*ōm-dur-män'*), Sudan, city on Nile River opposite Khartoum; pop. 126,650; ivory, gum arabic: *map* A-46, *picture* S-442*a*
Kitchener captures K-52, S-442*a*

O'men, sign or indication of some future occurrence, favorable or unfavorable. Primitive peoples believe flight and feeding of birds, action or sounds of animals or insects, and other natural phenomena and accidental happenings betoken future events. *See also in Index* Augurs

O'miak, umiak, or **oomiak,** Eskimo boat C-114

Ommiads (*ō-mī'ădz*), **Omayyads,** or **Umayyads,** dynasty of caliphs or successors of Mohammed who asserted rule over Mohammedan Empire from death of Ali, 4th caliph, to rise of Abbasids (661–750), and ruled in Spain (756–1031).

Omnibus bill, term applying to any bill carrying several separate and unrelated measures, but particularly used for Compromise of 1850. Most states now require each statute to relate to one topic only.

Omnirange. *See in Index* Aviation, *table* of terms

Omnivorous animals A-250

Omodeo, Giovanni Antonio. *See in Index* Amadeo, Giovanni Antonio

Omo River, or **Bottego River,** Ethiopia, flows into Lake Rudolf, *map* E-402

Omphale (*ŏm'fą-lē*), in Greek mythology, queen of Lydia whom Hercules served for three years as a punishment for having slain Iphitus; to please her Hercules wore her garments and spun wool while she wore his lion skin.

Omsk, Russia, administrative region of R.S.F.S.R., in w. Siberia; 556,000 sq. mi.; chief city Omsk: *maps* R-259, A-406

Omsk, distributing point for w. Siberia, on Irtish River and Trans-Siberian Railway, 280 mi. s.e. of Tobolsk; pop. 500,000; flour, farm machinery: *maps* R-259, A-406
all-Russian government (1918) W-240, 241

Ona, Indian tribe of Tierra del Fuego S-262–3, *picture* S-259

Onager (*ŏn'ą-jĕr*), a wild ass A-425

Onagraceae (*ŏn-ą-grā'sē-ē*), the evening primrose family, a botanical group of chiefly herbaceous plants containing about 40 genera and 500 species; most abundant in temperate America; familiar members are evening primrose, willow herb, fuchsia, and clarkia.

Oñate (*ōn-yä'tā*), **Juan de** (1549?–1624?), Spanish explorer and colonizer of New Mexico N-181
inscription on El Morro National Monument N-33

O'Neal, Jeffrey Hamet (flourished 1760–72), Irish painter
porcelain P-398

Onega (*ō-nä'gą*), **Lake,** also **Onejskoe-Ozero,** in n.w. Russia, 2d largest lake in Europe; 3700 sq. mi.; indented, rocky shores; outlet to White Sea, canal connection with Volga and Dvina; fisheries, timber trade: *maps* R-259, 266, E-419

"One good turn deserves another" F-3

'One-Hoss Shay, The Wonderful', poem by Oliver Wendell Holmes;

full title 'The Deacon's Masterpiece; or The Wonderful One-Hoss Shay'; tells how a carriage, built by a deacon so "that it *couldn't* fall down," fell to pieces all at once at the end of 100 years.

Oneida (*ō-nī'dą*), tribe of Iroquois Indians formerly living about Lake Oneida, N. Y.; one of Six Nations: *table* I-107

Oneida, N. Y., city 25 mi. e. of Syracuse; near Lake Oneida; pop. 11,325; silverware, caskets, furniture, automobile bodies; canneries: *map* N-205

Oneida, Lake, N. Y., *maps* N-196, 205

Oneida Community, communal religious settlement founded by John H. Noyes 1838, and established near Oneida, N. Y., 1847–48; dissolved 1879, and reorganized as Oneida Community, Ltd., a joint stock company engaged in the manufacture of silverware, with plants at Oneida, N. Y., Northampton, Mass., Niagara Falls and Toronto, Ontario, Canada, and Sheffield, England.

O'Neill, Eugene Gladstone (1888–1953), American dramatist O-383, A-231, D-134, *picture* O-383

O'Neill family, an Irish family long notable in fighting British rule; **Shane O'Neill** (1530?–67), fought and raided until defeated by O'Donnells; his nephew **Hugh O'Neill**, called the Great O'Neill (1540?–1616), 2d earl of Tyrone, sought Spanish aid against England; though able and victorious for a time, was defeated 1601; made peace 1603; fled 1607: I-231. *See also in Index* O'Donnell family

O'Neill, Rose (Cecil) (1874–1944), illustrator and writer, born Wilkes-Barre, Pa.; married Harry Leon Wilson 1902, divorced; best known as creator of the kewpie doll (novels: 'Garda' and 'The Goblin Woman').

Onejskoe-Ozero, in n.w. Russia. *See in Index* Onega, Lake

One-o-cat, forerunner of baseball B-71

Oneon'ta, N. Y., market for dairy products, on Susquehanna River 65 mi. s.w. of Albany; pop. 13,564; railroad shops; gloves, cloth; Hartwick College; State Teachers College: *map* N-205

On'ion, a biennial food plant O-383, *pictures* N-47, O-383
bulb structure B-348
growing in Japan, *picture* J-306
when and how to plant, *table* G-19

Onions, Oliver (legal name, George Oliver) (born 1873), English writer, born Bradford, England ('The Collected Ghost Stories of Oliver Onions'; novel, 'Poor Man's Tapestry', awarded 1947 James Tait Black memorial prize).

On'nes, Heike Kamerlingh (1853–1926), Dutch physicist, winner of Nobel prize for physics 1913; discovered method of liquefying helium; professor of physics, Leyden University in Netherlands.

Onomatopoeia (*ŏn-ō-măt-ō-pē'yą*), formation of words in imitation of natural sound as "cuckoo," "hum"; in rhetoric, use of imitative and naturally suggestive words.

Onondaga (*ŏn-ŏn-dą'gą*), Indian tribe of Iroquois group formerly living about Lake Onondaga, N. Y.; one of Six Nations: *table* I-107

Ontario, Calif., city 35 mi. e. of Los Angeles; pop. 22,872; fruit growing, dairying; electrical appliances; Chaffey Junior College; Army Air Corps pilot training school: *map, inset* C-35

Ontario, a central province of Canada; 412,582 sq. mi.; pop. 4,597,542; cap. Toronto: O-384–7, *maps* C-68–9, 72, *pictures* O-384–7
agriculture and dairying O-384, C-85, *picture* C-64
canals C-109: Sault Sainte Marie S-49–51; Welland Ship W-90
cities O-385, *list* O-384. *See also in Index* names of cities
Fort William F-243
Hamilton H-253
Kingston K-47
London L-307
Ottawa O-428–9, *picture* O-428
Toronto T-154–5
Windsor W-156
climate O-384
education O-386–7: Kingston K-47; London L-307; Toronto T-155
Georgian Bay H-452
government O-386
history O-387, C-96: rebellion of 1837 M-15
Laurentian Plateau L-137, O-384, *picture* C-70
libraries L-201
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manufacturing O-384–5, C-89: Hamilton H-253; Kingston K-47; London L-307; Ottawa O-428; Sault Sainte Marie S-51; Toronto T-155; Windsor W-156
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natural features O-384, *list* O-384
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Niagara Falls N-230, *picture-map* N-231
occupations, *pictograph* C-66
parks N-39, O-386, *map* N-38*f*
Fort Malden National Historic Park N-39
Fort Wellington National Historic Park N-39
Georgian Bay Islands National Scenic and Recreational Park N-38*f*
Point Pelee National Scenic and Recreational Park N-38*f*
St. Lawrence Islands National Scenic and Recreational Park N-38*f*
people O-386
products, *list* O-384
St. Lawrence River S-19–21, *map* S-20
shield F-136*a*, *color picture* F-131
transportation O-385

Ontario, Lake, smallest of Great Lakes; 7540 sq. mi.: O-387, G-178–85, *maps* G-179, 181
height and depth, *diagram* G-179
Welland Ship Canal W-90

Ontario Agricultural College, at Guelph, Ontario, Canada; founded 1874; agriculture, home economics, commercial baking.

'On the Crown', by Demosthenes D-67

'On the Morning of Christ's Nativity', poem by John Milton C-299

Onychophora (*ōn-i-kŏf'ō-rą*), in zoology, *Reference-Outline* Z-364
place in "family tree" of animal kingdom, *picture* A-251

On'yx, a semiprecious stone J-350

Onyx marble M-92

Oolakan. *See in Index* Candlefish

Oölitic (*ō-ō-lĭt'ĭk*) **limestone** L-244, Q-2, I-84

Oolong (*ų'lŏng*), a dark tea T-32

Oo'miak, omiak, or umiak, Eskimo boat C-114

Oostende, Belgium. *See in Index* Ostend

Ooze, deposit on sea bottom B-150

Ooze, or suede, leather L-149

OPA. *See in Index* Price Administration, Office of

Opah. *See in Index* Moonfish

Opal, a semiprecious stone consisting chiefly of silica and water; Sun God opal from a Persian temple, now in the Chicago Natural History Museum, is famous: J-350, *color picture* M-264
formed of quartz and water M-262
iridescence, *diagram* L-233
birthstone, *color picture* J-348

Opaque substances L-232

Opata (*ō-pä'tä*), a group of Indian tribes of the Piman linguistic stock living in the valleys of Rio Sonora and tributaries in Sonora, Mexico.

Opelika, Ala., city 57 mi. n.e. of Montgomery; pop. 12,295; farming: A-116, *map* A-127

Opelousas, La., city 54 mi. n.w. of Baton Rouge; pop. 11,659; cotton, sweet potato, other farming; oil and gas fields; cottonseed oil, lumber: *map* L-330

Open account, form of credit C-509

Open-chain hydrocarbons, in chemistry. *See in Index* Paraffin series

Open city, in military science, a city which claims immunity from bombardment or other violence on pledge that it will not be defended or used for military purposes
Paris, in World War II W-251

Open-cut coal mining. *See in Index* Strip mining

Open-door policy, term used to designate equality of commercial opportunity to all nations
China and the powers C-280, M-19

Open-end investment trust T-201

Open-hearth process, of steel manufacture I-242–3, 244, 247, *diagrams* I-236, 242, *pictures* I-235, 242
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Open market operations F-50

Open-pit mining M-270
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Open seasons, for hunting game H-451*b*

"Open Sesame" (*sēs'ą-mē*), magical words in 'Arabian Nights' story of Ali Baba A-293

Open shop, in industry L-70*b*

Opequon (*ō-pĕk'ŏn*) **Creek**, near Winchester, Va., Civil War battle (also called battle of Winchester), Sept. 19, 1864; Federals under Sheridan defeated Confederates under Early: S-147, H-296

Opera (*ŏp'ĕr-ą*) O-388–94, *pictures* O-388–94
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Mozart's operas M-443
opera houses T-112
place in history of music M-464
stories of famous operas O-389–94
Wagner's influence W-1

Opéra (*ō-pä-rä'*), theater in Paris, France P-83*b*, 85, *map* P-83*a*, *picture* P-82

Opéra bouffe (*bo̤f*) O-388, 396

Opera buffa (*bo̤'fä*) O-388, 395

Opéra comique (*kō-mēk'*) O-388, 396

Opera (*ŏp'ĕr-ą*) **glass** T-48
stereoscopic principle S-392

Operations, surgical. *See in Index* Surgery

Operation Skywatch. *See in Index* Ground Observer Corps

Operetta O-394–8, *pictures* O-395–7. *See also in Index* Music, *table* of musical terms and forms
high-school production, *picture* E-250

Ophelia (*ō-fē'lĭ-ą*), in Shakespeare's 'Hamlet', daughter of Polonius, beloved by Hamlet H-254

Ophidia, suborder of reptiles comprising the snakes S-209
Ophir (*ō'fẽr*), ancient land mentioned in Bible S-232
Ophiuchus (*ŏ-fĭ-ū'kŭs*), constellation in Northern Hemisphere, *chart* S-377
Ophthalmologist. *See in Index* Oculist
Ophthalmology (*ŏf-thăl-mŏl'ō-jĭ*) (from Greek meaning "eye" and "science"), a science which treats of the structure, functions, and diseases of the eye.
Ophthal'moscope, an instrument for examining the interior of the living eye; invented 1851 by Hermann von Helmholtz.
Opiates (*ō'pĭ-āts*) O-398, 399, N-13
Op'ish, secret language used by children C-240*c*
O'pitz, Martin (1597–1639), German poet; head of so-called First Silesian School; called "father of modern German poetry."
O'pium O-398–9, N-13, *picture* O-399
China C-270, O-398, 399
poisoning, antidote P-341
Opium poppy O-398, P-370, *picture* O-399
Opium War (1839–42) C-279
Opopanax (*ō-pŏp'ą-năks*), a gum resin obtained from roots of a species of parsnip (*Pastinaca opopanax*); formerly important as an antispasmodic medicine; used in perfumery.
Oporto, Portugal. *See in Index* Porto
Opos'sum, small marsupial O-399, *pictures* O-399, N-58
Oppenheim, E. Phillips (1866–1946), English writer of mystery stories and popular romances, especially of political intrigue ('The Great Awakening'; 'The Great Prince Shan'; 'The Fortunate Wayfarer').
Oppenheimer, J. Robert (born 1904), physicist, born New York City; with University of California and California Institute of Technology 1929–47, made director Institute for Advanced Study, Princeton, N. J., 1947–; director atomic bomb project, Los Alamos, N.M., 1943–45; chairman general advisory committee, U.S. Atomic Energy Commission 1947–52; member science advisory committee, Office of Defense Mobilization 1951–54: *table* A-464
Opper, Frederick Burr (1857–1937), cartoonist, born Madison, Ohio; illustrated for Bill Nye, Mark Twain, Finley Peter Dunne; created 'Happy Hooligan', 'Alphonse and Gaston', 'Our Antediluvian Ancestors'.
Opposition, in astronomy, the relative position of two heavenly bodies when they are 180° apart in longitude; usually applied to the position of the moon directly opposite the sun, or a star opposite the sun
Mars P-283
Ops (*ŏps*), in Roman mythology, wife of Saturn; goddess of plenty.
Optic, Oliver, pen name of William Taylor Adams (1822–97), author of boys' books; born Bellingham, Mass.; editor of *Oliver Optic's Magazine* ('Young America Abroad'; 'Starry Flag Series').
Op'tical center, of lens L-170
Optical glass, any kind used in optical instruments G-122*a*, *picture* C-89
Optical illusion I-43–4, *pictures* I-43–4. *See also in Index* Illusions
Optical instrument, one designed to act upon light
field glass T-48
lens L-164–70, *diagrams* L-165–9
microscope M-232–6, *pictures* M-232, 234
periscope P-153
polariscope L-235
spectroscope S-331–4, *pictures* S-333
telescope T-46–9, *pictures* T-46–9
Optician (*ŏp-tish'ăn*), one skilled in making spectacles S-330
Optic nerve E-460, *diagram* E-459
Optics, the branch of physics which deals with the phenomena of light. *See in Index* Light
Option, in law. *See in Index* Law, *table* of legal terms
Optometry (*ŏp-tŏm'ē-trĭ*), the scientific measuring of the refraction (visual power) and the muscular conditions of the human eye in order to prescribe lenses or prisms for correcting visual defects; the work done by an optometrist: *picture* C-454
Opuntia (*ō-pŭn'shĭ-ą*), a genus of cacti C-9, 10
Opus (plural **opera**). *See in Index* Music, *table* of musical terms and forms
Or, in heraldry H-341
Orach (*ŏr'ăch*), an annual plant (*Atriplex hortensis*) of the goosefoot family; native to Asia; grows to 6 ft.; leaves arrow-shaped; some varieties have reddish leaves and stocks; eaten boiled like spinach.
Oracle (*ŏr'ą-k'l*), **Delphic** D-62, A-274
consulted by: Cadmus C-13; Croesus C-515; Lycurgus L-354
Theseus' grave T-117
Oracle bones, China C-278
Oracle of Ammon, at Siwa oasis in Libyan Desert A-148
Oracle of Apollo, name sometimes given to Delphic oracle because it was at one time in possession of Apollo. *See in Index* Oracle, Delphic
Oracle of Zeus, at Dodona D-62
Oradea (*ō-räd'yä*), also **Oradea Mare** (*mä'rä*), German **Grosswardein**, old town in Rumania about 80 mi. n.w. of Cluj; founded by St. Ladislaus (1080); pop. 82,282; important railroad junction; potteries; agricultural trade: *maps* B-23, E-417
Oral method, in education of deaf D-25
Oral surgery M-164*a*
Oran (*ō-răn'*), Algeria, seaport and naval base on n. coast of Africa, 230 mi. s.w. of Algiers; pop. 244,594; exports cereals, olives, wine, tobacco, hides, and cattle; after centuries of Moorish or Spanish domination, was occupied by French in 1831: *maps* A-167, A-46
Orange, Calif., city 27 mi. s.e. of Los Angeles; pop. 10,027; valencia orange and other fruits, walnuts; fruit packing: *map, inset* C-35
Orange, France, principality in s.e.; fell to House of Nassau in 1531, under Nassau-Orange family until 1702, annexed to France in 1714. *See also in Index* Orange, House of
Orange, N. J., residential and manufacturing suburb 12 mi. w. of New York City; pop. 38,037; hats, electrical machinery, calculating machines; Orange, and East, West, and South Orange form "the Oranges": *map, inset* N-164
Orange, Tex., city 100 mi. n.e. of Houston, on Sabine River and Gulf Intracoastal Waterway; pop. 21,174; shipyards; rice and paper mills: B-88, 89, *map* T-91
garden nearby, *picture* T-79
Orange, a citrus fruit O-400–2, *pictures*, O-400–1, *color picture* F-309
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place in spectrum, *color diagram* C-391
secondary color, *color charts* C-392, 398
wave length of light L-233, S-332
Orange, House of, princely family whose heads were sovereigns of Orange (s.e. France); also held large possessions in the Netherlands and thus became defenders of Dutch liberty against Spanish oppression, and ancestors of present Dutch royal line: N-121
William the Silent W-139
William III of England W-138–9
Orange, osage. *See in Index* Osage orange
Orange bowl, at Miami, Fla. F-230
Orangeburg, S. C., city 35 mi. s. e. of Columbia; pop. 15,322; agricultural products; Claflin College and State Colored Normal, Industrial, Agricultural, and Mechanical College: *map* S-291
Orange Day, anniversary of battle of Boyne (July 12, 1690), an annual celebration in Northern Ireland.
Orange Free State, province of Union of South Africa; 49,647 sq. mi.; pop. 1,018,207; cap. Bloemfontein: O-402, *maps* A-47, S-242
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Orange Lake, in n. Florida, about 14 mi. long: *map* F-158
Orangemen, members of Orange Society of Irish Protestants in Ulster I-230*a*
Orange-peel dredge D-142
Orange pekoe tea, *picture* T-29
Orange River, large river in South Africa; flows 1100 mi. into Atlantic: *maps* S-242, A-47, 42
Orange root. *See in Index* Goldenseal
Orangutan (*ō-răng'ą-tăn'*), an anthropoid ape O-402, A-271, *pictures* O-402, A-271
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Oratorio. *See also in Index* Music, *table* of musical terms and forms
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famous American orators: Daniel Webster W-82–3; Patrick Henry H-339–40
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Oratory of St. Joseph, in Montreal, Canada M-381
'Orbis Pictus' (The World in Pictures), by John Comenius, first picture book for children (1657) L-269, *picture* R-88*d*
Orbit, astronomical, path taken by a heavenly body in moving about its center of attraction
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Orb web, of spider, *picture* S-343
Orcagna (*ŏr-kän'yä*), common name of Andrea di Cione (*chē-ō'nā*) (1308?–68?) also called Arcagnuolo, Italian sculptor, painter, architect.

musician, and goldsmith; noted for frescoes in Strozzi chapel of church of Santa Maria Novella, Florence; also for tabernacle, or canopy, over Bernardo Daddi's painting of the Madonna in the Or San Michele, Florence.

Orchard F-304–6, *pictures* F-304–6. *See also in Index* Fruit and fruit growing

Orchard Knob, Tenn.
Civil War C-199, *map* C-199

Orchard oriole O-425

Orchardson, Sir William Quiller (1835–1910), Scottish painter, born Edinburgh; famous for portraits, historical scenes, and genre paintings ('Lord Peel'; 'Voltaire'; 'Napoleon on Board the Bellerophon').

Orchestra (*ôr'kĕs-trą*) O-402–6, *pictures* O-403–5
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Orchid (*ôr'kĭd*), family of flowering plants O-406, F-164, *picture* O-406
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Orchid, poor man's. *See in Index* Schizanthus

Orchidaceae (*ôr-kĭ-dā'sē-ē*), orchid family O-406

"Orchid peat," fern F-53

Orchomenus (*ôr-kŏm'ĕ-nŭs*), ancient Greek city in Boeotia; great continental and maritime power in prehistoric times; capital of the Minyae; superseded by Thebes.

Orczy (*ôrt'sĭ*), **Emmuska, Baroness** (Mrs. Montagu Barstow) (1865–1947), Hungarian-English writer, born Hungary; wrote 'Scarlet Pimpernel' novels about Englishman whose band helped aristocrats escape during Reign of Terror in French Revolution.

Or'deal, trial by J-367

Order, in biological classification, a group of related families B-152
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insect orders I-160*a*
mammal orders M-82, *Reference-Outline* Z-364
reptile orders, *Reference-Outline* Z-364

Order for Merit, Germany D-40

Order in Council, in Great Britain any order issued by the sovereign on advice of the privy council
in Napoleonic wars W-11, 12

Order of Christ, founded in 1318 by King Diniz of Portugal and by Pope John XXII; papal branch continues as the Supreme Order of Christ; the Portuguese branch was made distinct in 1522, secularized in 1789, and discontinued in 1910 when Portugal became a republic.

Order of Leopold, Belgium D-40

Order of Merit, England D-43

Order of Pius IX, papal order founded 1847 by Pope Pius IX; awarded to nobility for virtue and merit.

Order of St. Gregory the Great, papal order founded 1831 by Pope Gregory XVI; awarded for distinguished work for the church.

Order of St. Michael and St. George, a British order of knighthood D-43

Order of St. Patrick, an Irish order of knighthood D-43

Order of St. Sylvester, papal order founded 1841 by Gregory XVI to absorb Order of the Golden Militia, or Golden Spur (founded 1559 by Paul IV). In 1905 divided into two orders, St. Sylvester and the Golden Militia.

Order of the Annunziata, chief secular order of knighthood in Italy, its members taking precedence over all state officials; established in 1362 as the Order of the Collar; Charles III changed the name in 1518: D-43

Order of the Bath D-43
stalls, Westminster Abbey, *picture* W-191

Order of the Garter D-43, W-155

Order of the Golden Militia, or **Golden Spur.** *See in Index* Order of St. Sylvester

Order of the Holy Sepulcher, papal order founded probably in 1496 by Pope Alexander VI (traditional foundation dates from 1099).

Order of the Thistle D-43

Orders, religious. *See in Index* Religious orders

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Orders of Foresters. *See in Index* Foresters, Orders of

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Ordinance of 1787, U.S., statute governing Northwest Territory N-299, A-396

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Ordinary, an early type of bicycle B-142, *picture* B-142

Ord'nance, heavy firearms, such as mortars and cannon A-397–400, *pictures* A-397–8, 400. *See also in Index* Artillery

Ordnance, Bureau of, U. S. Navy N-90

Ordnance Corps, U. S. Army A-380
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Ordovician (*ôr-dō-vish'ăn*) **period,** in geology G-59, *diagrams* G-52, 58, *table* G-57

Ore. *See in Index* Ores

Ŏre (*ûr'rŭ*), a bronze coin, one hundredth of a krone, historical value about 2/5 cent; used in Denmark, Norway, and Sweden.

Oreads (*ō'rē-ădz*), in Greek mythology, mountain nymphs N-318

Orebro (*ûr-rŭ-brą'*), Sweden, manufacturing and trading town on Svarta River near w. end of Lake Hjälmaren; pop. 66,548; diet of 1540 declared crown hereditary; diet of 1810 made Bernadotte crown prince; 13th-century castle and church: *map* E-424

Or'egon, a n.w. state of U.S.; 96,981 sq. mi.; pop. 1,521,341; cap. Salem: O-407–20, *maps* O-416–17, 413, 408, U-252, 307, *pictures* O-407, 409–10, 419
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Bonneville Dam. *See in Index* Bonneville Dam
Capitol, State, *picture* O-419
Chinese ring-necked pheasants introduced P-187
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trade, wholesale and retail O-412
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tree, state O-411

'Oregon', U.S. battleship, built 1896; junked Aug. 1942 for metal
in Spanish-American War S-325

Oregon, University of, at Eugene and Portland, Ore.; state control; chartered 1872; opened 1876; liberal arts, architecture and allied arts, business administration, education, journalism, health and physical education, law, music; graduate school at Eugene; dentistry and medicine at Portland: *picture* O-419

Oregon ash, tree (*Fraxinus oregona*) of olive family, found in moist valleys from Washington to California; grows to 75 ft. Wood used for tool handles, barrels, furniture, fuel. Sometimes called water ash.

Oregon Boundary Treaty (1846), between United States and Great Britain settling w. Canadian boundary O-419

Oregon Caves National Monument, in Oregon N-38, *map* N-18

Oregon cedar. *See in Index* Port Orford cedar

Oregon country O-410, 419

Oregon grape, a shrub (*Mahonia aquifolium*) of barberry family; prickly evergreen leaves, dainty yellow flowers followed by clusters of acid blue berries, which resemble small grapes
state flower of Oregon, *color picture* S-384*a*

Oregon maple. *See in Index* Bigleaf maple

Oregon myrtle. *See in Index* California laurel

Oregon pine. *See in Index* Douglas fir

Oregon plan, in legislation I-150

Oregon question, dispute with Great Britain O-419
Polk and "reoccupation" P-363

Oregon State College, at Corvallis, Ore.; state control; chartered 1858; opened 1868; liberal arts, agriculture, business, education, engineer-

ing, forestry, home economics, pharmacy, and science; graduate school.
Oregon Trail, emigrant route from Independence, Mo., to Fort Vancouver on the Columbia River O-420–2, F-40, *maps* O-421, R-159, *pictures* N-96, O-420
Parkman's book about P-86
O'Reilly, Alexander (1722–94), officer in Spanish army, born Ireland; governor of Louisiana 1769; put down revolt against first governor, executed leaders, won nickname Bloody O'Reilly; his administrative policies followed to end of Spanish period; made count 1771.
O'Reilly, John Boyle (1844–90), Irish poet, political leader, and journalist; sent to penal colony in Australia because of revolutionary activities in Ireland; escaped and settled in Boston, Mass.; editor of *The Pilot*, Roman Catholic newspaper ('Songs of the Southern Seas'; 'Moondyne'; 'America').
O'Rell, Max, pen name of Paul Blouet (1848–1903), French satirical writer, born in England; taught in St. Paul's School and in University of London; books written in French and translated into English ('John Bull and His Island': 'A Frenchman in America'; 'John Bull and Co.').
Orellana (*ō-rĕl-yä'nä*), **Francisco de** (1490?–1549?), Spanish explorer; discovered course of Amazon River in 1541: S-276
Orem, Utah, town 7 mi. n.w. of Provo in agricultural area; pop. 8351; truck gardening; tomato cannery, steel plant: *map* U-416
Ore Mountains, in Czechoslovakia. *See in Index* Erz Mountains
Orenburg, Russia. *See in Index* Chkalov
Ores, minerals containing metals or other valuable substances. *See also in Index* names of metals
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extracting metal M-176–7, *table* M-176
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radio detection of deposits R-41
Orestes (*ō-rēs'tēz*), in Greek mythology, son of Agamemnon and Clytemnestra; killed his mother because she had killed his father
Aeschylus' dramas G-210, F-316
Orford, earl of. *See in Index* Walpole, Horace; Walpole, Robert
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salicylic C-371: formula, *diagram* O-424*a*
tartaric T-20–1
Organic Act of 1912, Alaska A-137
Organic chemistry, branch of chemistry dealing with compounds of carbon which are typically found in living organisms O-424–424*d*, C-219, *diagrams* O-424*a*–*d*, *Reference-Outline* C-223
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Liebig's work L-221
organic acids. *See in Index* Organic acids
plastics P-311
silicones S-180
Organism, in biology L-224*a*, *b*
Organization chart G-166
Organization for European Economic Co-operation (OEEC), an organization of western European nations formed in 1948 to co-ordinate their efforts under the European Recovery Program (ERP) administered by the Economic Co-operation Administration (ECA) of the United States.
Organization of American States (OAS) L-122–3
intervention in Central American border disputes N-233
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Organized labor. *See in Index* Labor boards; Labor unions
Organized Reserves, U.S. Army A-383
Organ of Corti, in the ear E-171
Organol'ogy, of plants, defined B-262
Organon (*ôr'gă-nŏn*), the Greek word for "instrument"; the title applied to Aristotle's treatises on logic, because logic is the tool of thought.
Organ Pipe Cactus National Monument, in Arizona N-38, *map* N-18
Or'ganzine, a silk thread S-184
Orgburo, in Russian government R-282
Oriel (*ō'ri-ĕl*) **College**, Oxford University, England O-434, *picture* O-433
Oriental amethyst, purple variety of corundum used as gem stone.
Oriental cockroach, sometimes called the "black beetle"; only the male has functional wings: C-373, 374
Oriental dancing D-14*f*–*g*, *pictures* D-14*f*, *i*
Oriental emerald, green variety of corundum used as gem stone.
Oriental fruit moth, a lepidopterous insect (*Laspeyresia molesta*) I-163
Oriental horse H-428*a*
ancestor of Thoroughbred H-428*d*
Oriental Institute Museum, at Chicago, Ill. *See also in Index* Museums, *table*
mummy, *pictures* M-449
Oriental lace L-78
Oriental leaf butterfly, Indian leaf butterfly, dead leaf butterfly, or **Kallima** P-419, *pictures* P-420, I-158
Oriental poppy, a perennial plant (*Papaver orientale*) of the poppy family, native to Mediterranean region and Iran. Grows to about 4 ft.; leaves lobed, toothed, hairy; flowers scarlet with black spot at base of each petal, or orange, pink, or white, sometimes double: *color picture* F-173
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Oriental region, one of six zoogeographical divisions of world Z-361
Oriental rugs R-247–50, *color picture* R-249
prayer rug R-247
Turkey, *picture* T-217
Turkmen S.S.R., *picture* R-277
Oriental sculpture S-83–4, *color picture* S-72, *Reference-Outline* S-85
Orientalwood, also called **Australian** or **Queensland walnut** and **Australian laurel**, veneer wood from huge laurel tree (*Endiandra palmerstonii*) of Queensland coastal regions.
Orientation course, in colleges U-403
Oriflamme (*ôr'ĭ-flăm*) (golden flame), royal standard of France in medieval times; originally the bright red three-tongued banner of the abbey of St. Denis.
Origen (*ŏr'ĭ-jĕn*) (185?–254?), early Christian theologian, native of Alexandria, Egypt; exerted great influence in his day and for some time later; sought to reconcile Platonism and Christianity.
'Origin of Species by Means of Natural Selection, On the', book by Charles Darwin D-20, B-151
cats and red clover, relation E-213
Orill'ia, Ontario, Canada, summer resort, railroad and industrial town on Lake Simcoe, 64 mi. n. of Toronto; pop. 12,110; smelting works, planing mills, furniture, boats: *map* C-72
Orinoco (*ō-rē-nō'kō*) **River**, in South America O-424*d*, V-441, S-270, *maps* V-442, C-387, S-252, 256
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Raleigh's expeditions R-74
Oriole (*ō'ri-ōl*) O-424*d*–5, *picture* O-424*d*, *color pictures* B-163, 169, 183
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Orion (*ō-rī'ŏn*), in Greek mythology, hunter loved by Artemis O-425
Pleiades and P-321
Orion, a constellation O-425
directions found by, *diagram* D-94
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nebula N-106
Oriskany (*ō-ris'ka-nī*), N.Y., village 7 mi. n.w. of Utica; pop. 1346; Revolutionary War battle between Americans under General Herkimer and British and Indians (under St. Leger and Joseph Brant), Aug. 6, 1777; Herkimer was mortally wounded: *map* N-205
Orissa, state in e. India; area 60,136 sq. mi.; pop. 14,645,946; cap. Bhubaneswar; iron ore; rice, turmeric, fish; silver filigree work: *map* I-68*a*
Oristano (*ō-rēs-tä'nō*), gulf at central part of w. coast of Sardinia.
Orizaba (*ō-rē-sä'bä*), **Mount**, also **Citlaltepetl** (*sē-tläl-tä'pĕt-l*), highest peak in Mexico (18,700 ft.); 175 mi. s.e. of Mexico City: M-188, *map* M-189, *picture* M-191
height, comparative. *See in Index* Mountains, *table*
Orkhan (*ôr-kän'*) (1326–59), sultan of Turkey T-219–20
Ork'ney Islands, n.e. Scotland; 375 sq. mi.; pop. 21,258: O-425, *map* B-324
Or'lando (*ôr-lăn'dō*), lover of Rosalind in 'As You Like It' A-401
Orlando, Vittorio Emanuele (1860–1952), Italian statesman; favored intervention in World War I; prime minister 1917–19; one of leaders at Peace Conference; at first supported Fascism but soon resigned from parliament in protest: *picture* U-385
Orlando, Fla., city in central Florida; resort; many lakes within city limits; pop. 52,367; citrus fruit shipping and canning; Orlando Air Force Base; Rollins College nearby: *maps* F-158, U-253
'Orlando Furioso' (*fo-rē-ō'zō*), poem by Ludovico Ariosto I-260, S-414
puppet performance P-441
Orléannais (*ôr-lā-ä-nĕ'*), France, historic province, *map* F-270
Or'leanists, in French politics, supporters of House of Orléans
Burgundians and C-192
Louis Philippe (19th century) L-321

Orléans (*ôr-lā-äⁿ'*), **dukes of,** heads of a younger branch of French royal house of Bourbon.

Orléans, Louis Philippe, duke of (1747–93), "Philippe Égalité," the regent's great-grandson; as "Citizen Equality" was elected Paris deputy to Convention 1792; voted for death of Louis XVI; executed under the Terror. His son was Louis Philippe, king of the French.

Orléans, Maid of. *See in Index* Joan of Arc

Orléans, Philip, duke of (1674–1723), regent of France during minority of Louis XV; able but dissolute and corrupt; supported "Mississippi Bubble" scheme.

Orléans, France, historic city; pop. 64,755: O-425, *maps* F-259, 270, E-425
housing project, *picture* F-274
Joan of Arc at J-355, *picture* H-447
siege (1428–29). *See in Index* Siege, *table*

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Orlon, a synthetic substance N-318
inspecting bobbins of yarn, *picture* S-293
plant, Camden, S. C., *picture* S-284

Or'lov, a famous diamond D-80, *picture* D-79

Or'mandy, Eugene (born 1899), American conductor, born Budapest, Hungary; came to America 1921; conductor Minneapolis Symphony Orchestra 1931–36; conductor of Philadelphia Orchestra 1936–.

Ormazd. *See in Index* Ahur Mazda

Or'molu, gilded bronze, decoration I-179

Ormuz, island of Iran. *See in Index* Hormuz

Ormuz, Strait of, or Hormuz, Strait of, between Iran and Arabian peninsula, *maps* A-285, I-224

Ormuzd. *See in Index* Ahur Mazda

Orne (*ôrn*) **River,** in Normandy; flows n. 95 mi. to English Channel.

Ornithischia, order of dinosaurs R-116

Ornithogalum (*ôr-nĭ-thŏg'ą-lŭm*), a genus of perennial plants of the lily family; native to the Eastern Hemisphere; the Cape Chincherinchee (*O. thyrsoides*) has a striking triangular cluster of white, apricot, or yellow flowers. Star-of-Bethlehem is *O. umbellatum.*

Ornithologists' Union, American B-195

Ornithol'ogy, a division of zoology which deals with study of birds. *See also in Index* Birds

Ornstein, Leo (born 1895), American pianist and composer, born in Russia; ultramodern in earlier compositions; declared he was "not concerned with form or with standards of any nature" ('Wild Man's Dance').

Orontes (*ō-rŏn'tēz*) **River,** Arabic **Nahr el 'Asi** (*nä'h'r ăl ä'sĭ*), in Lebanon, n.w. Syria, and s. Turkey; about 250 mi. long: S-487

'Oroono'ko', title of a novel by Alphra Behn dealing with the mistreatment and tribulations of an African prince sold as a slave in Surinam (Dutch Guiana).

Orozco (*ō-rōs'kō*), **José Clemente,** (*1883–1949*), Mexican artist of modernist school, famous for powerful black and white drawings and caricatures as well as for paintings; did murals for New School for Social Research, New York, and library at Dartmouth College: L-116
'Zapatistas' P-37*a*, *color picture* P-37

Orpah, in Bible, sister-in-law of Ruth R-299

Orpen, Sir William (1878–1931), British painter, born Dublin; his portraits show broad and free technique; official British artist during World War I; knighted 1918.

Orpheus (*ôr'fē-ŭs*), in Greek mythology, musician of marvelous powers O-425–6, *picture* O-426

'Orpheus and Eurydice', by Watts, *picture* O-426

Orpiment, sulfide of arsenic M-262

Orpine (*ôr'pĭn*) **family,** or **Crassulaceae** (*krăs-ū-lā'sē-ē*), a family of plants and shrubs including the houseleek, the sedums, live-forever, the kalanchoes, and the echeverias.

Or'pington, a breed of poultry P-402*b*, *picture* P-402*a*

Orr, John Boyd, first **Baron Boyd-Orr.** *See in Index* Boyd-Orr

Orrefors glass, *picture* G-125

Orrisroot (corruption of "iris root") I-232

Or San Michele (*ôr sän mē-kä'lā*), **Madonna of,** famous painting by Bernardo Daddi in the Or San Michele, a building of the grain merchants, later converted into a church; this Madonna was declared on Aug. 13, 1365, by the Florentine Republic, to be the protectress of the Florentines; it is enshrined in a tabernacle of Florentine Gothic style by Orcagna.

Orsini (*ôr-sē'nē*), a noble Roman family, which first appears prominently in 12th century; conflict with Colonna, a rival family, kept Rome in a turmoil for centuries; three of its members became popes (Celestine III, Nicholas III, and Benedict XIII); many others were prominent in church and state.

Orsova (*ôr'shô-vä*), Rumania, a fortified island-town on the Danube River near Iron Gate; pop. 5107.

Orsted, Hans Christian. *See in Index* Oersted

Ortega (*ôr-tä'gä*), **José Francisco de,** scout in expeditions of Gaspar de Portola C-46

Ortega y Gasset (*ē gä-sĕt'*), **José** (born 1883), Spanish philosopher, essayist, and statesman, born Madrid, Spain; famed for humanistic approach to philosophy; helped to set up Spanish republic 1931 ('The Revolt of the Masses').

Orteig, Raymond (1870–1939), French restaurateur and patron of aviation; came to New York City as a boy; owner of Hotel Lafayette
prize won by Lindbergh L-253

Orthochromat'ic film P-224

Or'thoclase, a glassy, variously colored silicate of potassium and aluminum M-266

Or'thodox Eastern church, or **Orthodox Greek church.** *See in Index* Greek Orthodox church

Orthograph'ic, map projection M-84, *diagram* M-85

Orthographic projection, in mechanical drawing, M-157*f–g*, *picture* M-157*g*

Orthog'raphy, correct or standard spelling; from Greek meaning "straight, or correct, writing." *See also in Index* Spelling

Orthomorph'ic, or **conformal,** map projection M-85

Orthopedics (*ôr-thō-pē'dĭks*), in medicine and surgery M-164

Orthop'tera, order of insects I-160*a*

Orthorhom'bic crystals M-262

Ortiz (*ôr-tēth'*), **Juan** (died 1542), Spanish adventurer, survivor of Narváez's expedition; captured by Indians on return to Florida from Cuba; rescued after 11 years by De Soto's men; interpreter for De Soto 1539–42.

Ortiz Rubio, Pascual (born 1877), Mexican political leader and diplomat president of Mexico M-208

Ort'ler, *highest point in Tyrol and* in eastern Alps (12,800 ft.).

Or'tolan
bobolink B-219
European bunting B-353

Orton, Helen Fuller (1872–1955), author of children's books, born Niagara County, N. Y.; first books, for small children, followed by historical stories and mysteries ('Twin Lambs'; 'Treasure in the Little Trunk'; 'Mystery of the Lost Letter').

Oruro (*ō-rǫ'rō*), city in w. Bolivia; railroad and tin-mining center; pop. 62,975: *map* S-252

Orvieto (*ôr-vē-yā'tō*), Italy, town and Episcopal see in province of Perugia, 80 mi. n.w. of Rome; built on a rock commanding fine views; numerous 13th-century houses and palaces; Gothic cathedral begun in 1290; pop. 8883.

Orwell, George, pen name of Eric Blair (1903–50), English writer, born India; 5 years with Imperial Police in Burma; fought for Loyalists in Spain ('Animal Farm' and 'Nineteen Eighty-Four', attacks on totalitarian state; 'Homage to Catalonia', memoir, excellent book on Spanish civil war).

Osage (*ō-sāj'*), Indian tribe that lives in Oklahoma, *map* I-106*f*, *table* I-108

Osage orange, North American tree (*Maclura pomifera*) with inedible fruit, resembling a large orange; wood bright yellow, fine grained, and very elastic
hedges H-329

Osage River, about 250 miles long, formed in state of Missouri by junction of Marais des Cygnes River and Little Osage River, flows generally n.e. through Lake of the Ozarks to Missouri River at Osage City 10 mi. below Jefferson City, Mo.: O-440, *maps* M-312, 318. *See also in Index* Bagnell Dam

Osaka (*ō'sä-kä*), 2d city and chief manufacturing center of Japan on Osaka Bay; pop. 1,956,136: O-426, *maps* A-406, J-297

Osawatomie (*ōs-ą-wąt'ō-mĭ*), Kan., city 45 mi. s.w. of Kansas City; pop. 4347; attack of proslavery men 1856 resisted by John Brown and followers; latter finally overpowered and town practically destroyed: *map* K-11
John Brown at B-331

Osawatomie Brown, American abolitionist. *See in Index* Brown, John

Osborn, Chase Salmon (1860–1949), political leader, born Huntington County, Ind.; newspaper publisher 1883–1912; governor of Michigan 1911–12; agitated for inclusion of Great Lakes water areas in official areas of adjoining states; wrote 'The Iron Hunter', 'The Earth Upsets'.

Osborn, Henry Fairfield (1857–1935), paleontologist, born Fairfield, Conn.; with American Museum of Natural History from 1891, president 1908–33; with U. S. Geological Survey from 1900; research professor zoology, Columbia University, from 1910 ('Men of the Old Stone Age'; 'Origin and Evolution of Life'; 'Impressions of Great Naturalists'; 'Creative Education').

Osborne, Thomas Mott (1859–1926), prison reformer, born Auburn, N. Y.; as warden of Sing Sing 1914–16 and of Portsmouth Naval Prison 1917–20 applied his Mutual Welfare League plan; wrote *'Society and Prisons'*, 'Prisons and Common Sense'.

Osborne, estate near East Cowes, Isle of Wight; convalescent home for army and navy officers; site of a Royal Naval College 1903–21
British royal residence W-134

Osbourne, Fanny de Grift (1840?–1914), wife of Robert Louis Stevenson S-394

Osbourne, Lloyd (1868–1947), American author, stepson of Robert Louis Stevenson S-394

"Oscar," statuette presented annually by Academy of Motion Picture Arts and Sciences; sketched by Cedric Gibbons, Hollywood art director, 1928, modeled by George Stanley, Los Angeles sculptor; first awarded in 1929; name originated 1931 when Academy employee jested that statuette reminded her of Uncle Oscar: M-431, *picture* M-431

Oscar I (1799–1859), king of Sweden and Norway, son of Bernadotte (Charles XIV); succeeded to throne 1844.

Oscar II (1829–1907), king of Sweden and Norway 1872–1905, king of Sweden 1905–7; known as musician and author ('Memoirs of Charles XII').

Osceola (*ŏs-ē-ō'lą*) (1804–38), Seminole Indian chief O-426–426*a*, *picture* O-426

Oscillation, of electric current R-33, 42
applied to clocks W-59
vacuum tube, action E-320–1, R-38

Oscil'loscope, device for detecting deflection of electrons in vacuum tubes E-318, *diagrams* E-319
loran use R-28
radar use R-26–7, *diagram* R-26, *pictures* R-25, 27, 28

Oscines (*ŏs'i-nēz*), scientific name for songbird group.

Ösel, Estonia. *See in Index* Saaremaa

Osgood, Frances Sargent Locke (1811–50), poet, born Boston, Mass.; published many poems and a few prose tales; friend of Edgar Allan Poe.

Osgood, Samuel (1748–1813), soldier and political leader, born Andover, Mass.; fought in American Revolution; member of Continental Congress 1781–84, commissioner of treasury 1785–89, postmaster general 1789–91: P-387

O'Shaughnessy (*ō-shą'nĕ-sĭ*), **Arthur William E.** (1844–81), English poet; associated with pre-Raphaelites; verses of haunting beauty ('Epic of Women'; 'Lays of France'; 'Music and Moonlight').

O'Shaughnessy Dam, in California, on Tuolumne River. *See also in Index* Dam, *table*

Osh'awa, Ontario, Canada, city on Lake Ontario, 30 mi. n.e. of Toronto, in agricultural district; pop. 41,545; automobiles, glass products, iron castings, textiles: *maps* C-72, *inset* C-68

O'Sheel, Shaemas (born 1886), poet and critic, born New York City; poetry imaginative, sensitive, and mystical, strongly influenced by Irish ancestry ('He Whom a Dream Hath Possessed').

Osh'kosh, Wis., city at junction of Fox River and Lake Winnebago, 75 mi. n.w. of Milwaukee; pop. 41,084; textiles, leather goods, shoes, woodwork, rugs, automobile bodies and parts; Wisconsin State College: W-178, *maps* W-173, U-253

Osiers (*ō'zhērz*), willows W-143

Osiris (*ō-sī'ris*), ancient Egyptian deity O-426*a*, E-283
Isis, wife and sister of I-255

Oskaloo'sa, Iowa, agricultural center 65 mi. s.e. of Des Moines; pop. 11,124; valves, wood toys, clay products; William Penn College: *maps* I-215, U-253

Osler (*ŏs'lĕr*), **Sir William** (1849–1919), Canadian physician O-426*a*, *picture* O-426*a*

Oslo (*ŏs'lō*), formerly **Christiania** (name changed 1925), capital and chief seaport of Norway; pop. 434,047: O-426*a–b*, N-304*b*, *maps* N-301, E-416, 424, *picture* N-304
library, children's room, *picture* L-185
museums O-426*b*. *See also in Index* Museums, *table*
rainfall N-302

Oslofjord (*ŏs'lō-fyōrd*), s. Norway, wide, shallow inlet opening off Skagerrak and Kattegat N-302, O-426*a*, *maps* N-301, E-424

Osman I. *See in Index* Othman I

Osmeña, (ōs-mā'nyą), Sergio (born 1878), Filipino statesman; senator Philippine Assembly 1922–35; 1st vice-president Philippine Commonwealth (1935); on death of Quezon, 1944, became 2d president, and served until 1946: *picture* P-192

Osmium, a chemical element; rare bluish-white metal, very hard and heavy: *tables* P-151, C-214
found with platinum P-315

Osmo'sis L-265, P-292, *diagram* L-265, *picture* P-293
plants P-292–3, *picture* P-293

"Osmundine," ferns F-53

Osnabrück (*ŏs-nä-brük'*), or **Osnaburg**, Germany, industrial town on Haase River 30 mi. n.e. of Münster; pop. 109,538; iron and steel manufactures; member of Hanseatic League: *maps* G-88, E-424

Os'naburg, originally a coarse linen cloth made in Osnabrück (or Osnaburg), Germany; now a strong, cheap, unbleached cotton fabric used chiefly for sacking.

Osorno (*ō-sōr'nō*), Chile, distributing center for farming, dairying, and stock-raising region, about 600 mi. s. of Santiago; pop. 16,000; tourist center: C-254, *map* C-250

Osorno, Mt., volcanic peak in s. Chile, *picture* S-248

Os'prey, or fish hawk H-292–3
eagle robs E-167

Ossa, Mount (modern **Kissoro**), in Thessaly. *See in Index* Pelion

Os'sa innomina'ta (nameless bones), the hipbones S-192

Ossendowski (*ŏs-sĕn-dŏf'skĕ*), **Ferdinand Anthony** (1876–1945?), Polish scientist, explorer, and writer, imprisoned by Russian government; wrote books on Russian prison system; 'Beasts, Men and Gods' recounts journey through Asia.

Ossian (*ŏsh'ăn* or *ŏs'ĭ-ăn*), also **Oisin** (3d century), legendary Irish bard O-426*b*, I-234

Os'sining, formerly **Sing Sing**, N.Y., residential village on Hudson River 31 mi. n. of New York City; pop. 16,098; stoves, clothing, engines, drugs; Sing Sing State Prison is just south: *map*, *inset* N-204

Ossoli, Margaret Fuller. *See in Index* Fuller, Margaret

Ostade (*ōs-tăd'-dŭ*), **Adrian** (1610–85), Dutch painter, pupil of Hals; vigorous treatment of rustic life.

Ostade, Isaac (1621–49), Dutch painter, brother of Adrian; noted for winter landscapes.

Ostend (*ŏs-tĕnd'*), Belgium, also **Oostende**, seaport and resort on North Sea, 67 mi. n.w. of Brussels; pop. 49,651; repeatedly shelled in World War I; harbor closed by British by sinking of ships May 10, 1918; became temporary capital of Belgium 1940: *maps* B-111, E-424, *picture* B-116
siege (1601–4). *See in Index* Siege, *table*

Ostend Manifesto (1854) C-332, P-252

Osten'so, Martha (born 1900), American novelist, born Bergen, Norway; family came to America when she was 2, and lived in Minnesota, South Dakota, and Manitoba; won prize, 1925, with 'Wild Geese', realistic novel of northern prairie ('Dark Dawn'; 'Young May Moon'; 'Waters under the Earth').

Osteol'ogy, the science or study of the bones.

Osteop'athy O-426*b*

Österreich, "eastern realm," German name of Austria A-495, 496

Ostia (*ŏs'tĭ-ą*), ancient port of Rome at mouth of Tiber now mostly covered with sand; important ruins revealed by excavations; modern Ostia about ½ mile distant.

Os'tiaks, tribe of Finno-Ugric group inhabiting Ob Valley in w. Siberia; their language is related to Magyar tongue: R-262

Ostmark, east "march," or province, early German name of Austria, revived by Hitler A-495, 496

Ostracism (*ŏs'trą-sizm*), in ancient Greece, banishment by popular vote Aristides A-338–9, *picture* G-199

Os'trakon, ancient ballot A-339, *picture* G-199

Os'trea, the oyster genus O-436

Os'trich, largest living bird O-426*b*–7, *picture* O-426*b*
altitude range, *picture* Z-362
egg O-427
farming O-427
feathers O-427
foot O-426*b*–7, *picture* B-175
leather made from hide L-150
length of life, average, *pictograph* A-249
protective coloration, *picture* P-421

Ostrich, American, rhea R-132, *picture* R-132

Os'trogoths, or **East Goths** G-143–4

Ostrolenka (*ŏs-trō-lĕng'kă*), or **Ostroleka**, Poland, town 60 mi. n.e. of Warsaw; pop. 9279; French defeated Russians 1807 and Russians suppressed Polish uprising 1831; changed hands frequently in World War I: *map* E-424

Ostrovsky (*ŏs-trŏf'skĕ*), **Alexander Nikolaevich** (1823–86), Russian dramatist, born Moscow; studied law; realistic comedies and tragedies built around middle-class Russian life ('The Storm'; 'Poverty Not a Vice'; 'The Bankrupt').

Ostwald (*ŏst'vält*), **Wilhelm** (1853–1932), German chemist; professor of chemistry, University of Leipzig; leader in modern physical chemistry; Nobel prize winner in chemistry 1909; aided Germany in World War I by discovering new method of making from ammonia the nitric acid and nitrates needed for explosives.

Osumi Strait, Japan, s. of Kyushu Island; separates it from Tanega Island: *map* J-297

Oswe'go, N.Y., port and reshipment point for coal, grain, and lumber on Lake Ontario at mouth of Oswego River; pop. 22,647; machinery, matches, knit goods; State Teachers College; Fort Ontario: *maps* N-204–5, U-253

Oswego Canal, the 24 mi. canalized Oswego River in New York entering Lake Ontario at city of Oswego: part of New York State Barge Canal: N-211, *maps* N-196, 205

Oswego tea, **bee balm**, or **fragrant balm**, a tall showy perennial herb (*Monarda didyma*) of the mint

family and horsemint genus; brilliant red or pink flowers.
Otaru (*ō-tä-rō*), Japan, chief town on s.w. coast of Hokkaido Island on s. shore of Ishikari Bay; pop. 178,330; marine experiment station; fisheries; large trade: *map* A-406
'Otel'lo', opera by Verdi O-392, V-450
'Othel'lo', tragedy by Shakespeare O-427
chronology and rank S-129
Oth'man I, or Osman I (1259?–1326), Turkish sultan, founder of Ottoman Empire T-219
Otho, Holy Roman emperors. *See in Index* Otto
O'tis, Elisha Graves (1811–61), inventor of elevator improvements; born Halifax, Vt.: E-329
Otis, Elwell Stephen (1838–1909), soldier, born Frederick, Md.: served Federal army in Civil War; military governor and commander of forces in Philippines; major general 1900.
Otis, James (1725–83), American Revolutionary War orator O-427–8
burial place, Boston B-258
Oto, Indian tribe of Siouan stock; after various migrations from Wisconsin to Iowa and Nebraska were removed to Indian Territory (Oklahoma) in 1882.
Otoconia, or ear dust E-171
Otranto (*ō-trän'tō*), seaport on s.e. coast of Italy 46 mi. s.e. of Brindisi; during Middle Ages chief Adriatic port of Italy; sacked by Turks (1480): *map* B-23
Otranto, Strait of, passage connecting Adriatic and Ionian seas and separating Italy from Albania; minimum width approximately 45 mi.: *maps* B-23, E-425
O'Trigger, Sir Lucius, in Richard Brinsley Sheridan's comedy 'The Rivals', fortune-hunting, duel-loving Irishman.
Ottakar II. *See in Index* Ottokar II
Ottar (9th century), Norwegian explorer P-348
Ottar, otto, or attar, of roses P-148
Ottawa (*ŏt'ə-wə*), Indian tribe that lives in Ontario and Quebec, Canada, *table* I-107
Pontiac I-110*b*
raid Pennsylvania settlements P-139
Ottawa, Ill., farming trade center on Fox and Illinois rivers, 70 mi. s.w. of Chicago; pop. 16,957; glass, pottery, brick and tile, agricultural implements; glass sand and fire clay nearby: *map* I-36
Ottawa, Kan., city 50 mi. s.w. of Kansas City in farming and livestock section; pop. 10,081; steel products, tractors, and airplane parts; Ottawa University: *map* K-11
Ottawa, Ontario, capital of Canada; pop. 202,045: O-428–9, *maps* C-69, 72, *picture* O-428
Library of Parliament L-202, *picture* L-202
museums. *See in Index* Museums, *table*
Parliament Building, *pictures* C-92, O-428
Ottawa, University of, at Ottawa, Ontario, Canada; Roman Catholic; founded 1848; charters in 1866 and 1889; arts and sciences, applied science, library science, medicine, music, normal school, nursing, political science, theology.
Ottawa River, Canada, chief tributary of St. Lawrence; rises in Quebec, flows w., and then s.e., forming boundary between Quebec and Ontario; length 685 mi.; enters St. Lawrence by 2 channels enclosing Montreal island: O-428, *maps* C-69, 72
Algonquian route G-185
Rideau-Ottawa Canal system C-109
Ottawa University, at Ottawa, Kan.; Baptist; founded 1865; arts and sciences.
Ot'ter, a weasellike, aquatic mammal O-429, *pictures* O-429, N-62
altitude range of sea otter, *picture* Z-362
Otterbein (*ŏt'ĕr-bīn*), **Philip William** (1726–1813), American clergyman, born Germany; founded United Brethren in Christ.
Otterbein College, at Westerville, Ohio; Evangelical United Brethren; founded 1847; arts and sciences, education, fine arts, music.
Ot'terburn, village in n.e. England; Scots under Douglas defeated English under Percy 1388; battle celebrated in ballad of Chevy Chase.
Otter Creek, a river in w. Vermont, about 110 mi. long, *maps* V-457, N-144
Otterhound, table D-118*a*
Otter shrew, an aquatic mammal of Africa, related to shrews and to moles; lives in Cameroons, Congo, and Angola; total length about 24 in. (half of this is tail); fur is brown above, whitish below; scientific name *Potamogale velox.* In fur trade, the fur of the otter shrew is sometimes called desman. *See also in Index* Desman
Otter trawl F-113, *pictures* F-112, U-282
Ottery St. Mary, village of Devonshire, England; pop. 4015; birthplace of Samuel Taylor Coleridge; the Clavering of Thackeray's 'Pendennis': C-381, *map* B-325
Ot'to I, or Otho I, the Great (912–973), Holy Roman Emperor O-430
empire, extent of G-96
subdues Magyars H-448
Otto II, or Otho II (955–983), emperor O-430
Otto III, or Otho III (980–1002), emperor O-430
Charlemagne's tomb opened by A-1
Otto IV, or Otho IV (1175?–1218), emperor O-430
Otto (1848–1916), king of Bavaria; insane throughout reign (1886–1913); his uncle, Prince Luitpold, regent until 1912; deposed.
Otto (1815–67), king of Greece, son of Louis I of Bavaria G-193
Otto, Nikolaus A. (1832–91), German inventor
four-stroke cycle gas engine A-504
Otto, ottar, or attar, of roses P-148
Ot'tokar II, or Ottakar II (1230?–78), king of Bohemia; acquired Austria, Carinthia, Carniola, and Styria; later lost all except Bohemia and Moravia; famous for handsomeness, cleverness, and valor
Ot'toman Empire, former name of Turkish Empire, T-220, 220*a*, *map* T-220
Ottoman Turks, branch of Turks which founded and ruled Turkish Empire; named from Othman, first sultan (reigned 1288–1326): T-219–20
Mesopotamia ruled by M-175
Rhodes conquered by R-144
Ottum'wa, Iowa, center of agricultural and coal-mining district, 75 mi. s.e. of Des Moines on Des Moines River; pop. 33,631; abundant water power; machinery, iron products, packed meat: I-220, *maps* I-215, U-253
Otway, Thomas (1652–85), English dramatist, born near Chichester, England; remembered for tragedies ('Don Carlos', in rhymed verse; 'The Orphan' and 'Venice Preserv'd', in blank verse).
Ou, a Hawaiian songbird (*Psittirostra psittacea*).
Ouachita Baptist College, at Arkadelphia, Ark.; controlled by Arkansas Baptist Convention; opened 1866; arts and sciences, education.
Ouachita Mountains, outlying portion of main Ozark Plateau, s. of Arkansas River in Oklahoma and Arkansas; height 1500 to 2500 ft.: *maps* A-366, O-364, U-250, 274
Magazine Mountain, *picture* A-360
whetstone rock A-360
Ouachita National Forest, national forest preserve in s.e. Oklahoma and w.-central Arkansas; comprises 2,132,286 acres in Arkansas and 291,509 acres in Oklahoma; mainly short-leaf pine and hardwoods.
Ouachita River, rises in w. Arkansas and flows s.e. across n. Louisiana to Red River near the latter's junction with the Mississippi: *maps* A-366–7, L-333, U-274
Ouargla, or **Wargla** (*wär'glä*), Algeria, oasis town in Sahara about 200 mi. s. of Biskra; pop. 5461: *map* A-46
Oubangui Chari (*o-bäŋ-gē' shä-rē'*), also **Ubangi-Shari** (*ū-bäng'gē-shä'rē*), territory in central French Equatorial Africa; approximately 238,000 sq. mi.; pop. 1,068,400; cap. Bangui: *map* A-46
Oud, J. J. P. (born 1890), Dutch architect and modernist, born Purmerend, Netherlands; aimed for "purity of form, straightness of line, equilibrium of proportions"; important buildings in Amsterdam and Rotterdam.
Oudenarde (*od-närd'*), Belgium, town on Scheldt River 18 mi. s. of Ghent; victory of Allies under Marlborough and Prince Eugene of Savoy over French under Vendôme (1708).
Oudh (*oud*), region in Uttar Pradesh state, India; chief city Lucknow
Begum of, and Hastings H-280
Ouessant, Ile d' (*ēl' dwĕ-säŋ'*), or **Ushant** (*ŭsh'ənt*), westernmost island of France (lighthouse 48° 27' N., 5° 8' W.), in Atlantic Ocean w. of Brittany; area 6 sq. mi.; pop. 2223; naval battles between French and English 1778 and 1794: *map* E-425
Ouida. *See in Index* De la Ramée, Louisa
Ouimet (*wē'mĕt*), **Francis** (born 1893), amateur golfer, born Brookline, Mass.; won U.S. Open 1913 and U.S. Amateur 1914 and 1931
Golf's Hall of Fame G-138
Ounce, the snow leopard, *picture* L-170
Ounce, unit of weight and measure, *tables* W-87, 88
'Our American Cousin', play by Tom Taylor; first produced 1858; at a performance of this play President Abraham Lincoln was assassinated.
Our American Heritage, *pictures* A-218–23, *Reference-Outline* A-218–23
Ouricury, or licuri, name for useful wax scraped from leaves of licuri palm (*Syagrus coronata*) abundant in state of Bahia, Brazil: W-76
Our Lady of the Elms, College of, at Chicopee, Mass.; Roman Catholic; for women; founded 1928; arts and sciences.
Our Lady of the Lake College, at San Antonio, Tex.; Roman Catholic; for women; founded 1912; arts and sciences, business administration, education, home economics, library science, social service; coeducational in music and graduate school.

'Our Mutual Friend', novel by Charles Dickens (1865); two plots are tied together by Mr. Boffin, the Golden Dustman, and his wife: D-84*a*
Oursler, (Charles) Fulton (1893–1952) (pseudonym Anthony Abbot), writer and editor, born Baltimore, Md.; editor *Liberty* magazine 1931–42 (life of Jesus, 'The Greatest Story Ever Told', basis for radio program of same name; story of the Old Testament, 'The Greatest Book Ever Written').
Ourthe (*ŏrt*), river of Belgium, flows n. 100 mi. to Meuse at Liége, *map* B-111, *picture* B-114
'Our Young Folks', a children's magazine L-274
Ouse (*ōz*), river in Sussex, England; 30 mi. long; flows into English Channel at Newhaven.
Ouse, river in Yorkshire, England; about 60 mi. long; flowing s.e., joins the Trent River to form the Humber: *map* B-321
Ouse, or Great Ouse, river in s.e. England; about 160 mi. long; flows n.e. into The Wash; one of its tributaries is Little Ouse: *maps* B-321, 325
Ousel (*o͞o'zl*), or ouzel, former name of the blackbird, now given to European and American dipper.
Outboard motor, *picture* M-435
Outboard motorboats B-217
Outcasts, of India I-58
Outcault, Richard Felton (1863–1928), comic artist and advertising man, born Lancaster, Ohio; created 'Hogan's Alley'; 'Yellow Kid'; 'Buster Brown'
estimate of Randolph Caldecott L-207
Outer Islands, East Indies E-207
Outer Mongolia. *See in Index* Mongolian People's Republic
Outfielder, in baseball B-69–70, *picture* B-68
Outlanders. *See in Index* Uitlanders
Outlines. *See in Index* Reference-Outlines
Outline stitch, in sewing S-112, *diagram* S-111
"Out of sorts," in printing T-229
Outram (*o͞o'trăm*), Sir James (1803–63), English general, hero of Indian Mutiny; given title "the Bayard of India" by Sir Charles Napier, his superior, when he defended British residency at Hyderabad against 8000 Baluchis 1843: helped to hold Lucknow against siege 1857.
Outremont (*o͞o-trŭ-môn'*), Quebec, Canada, residential suburb n. of Montreal; pop. 30,057.
Outrider, an attendant riding on a horse beside a carriage or on one of the horses drawing a carriage
royal coach outriders, England, *picture* G-67
Outrigger, a device attached to the side of certain boats of narrow beam to prevent capsizing B-219, *pictures* B-218, P-13
Ouzel. *See in Index* Ousel
Ova. *See in Index* Ovum
Oval window (inner ear) E-170, *pictures* E-170–1
O'vary, in flowering plants, the receptacle in which fertilized seed germs develop F-184, *pictures* F-182, 183, 185
changes during fruit development F-186
Oven
annealing, in glassmaking G-122, *picture* G-120
bakery B-296, *picture* B-297
coke C-380
Egyptian peasant's home E-273
primitive, *pictures* B-294, 295, C-389, G-192
Russian peasant's home R-264
tunnel oven for pottery and porcelain firing P-400
Ovenbird, a warbler W-7
Oven canning, of food F-222
Overcasting, in sewing S-112, *diagrams* S-111, 112
Overcup oak, tree (*Quercus lyrata*) of beech family, grows to 100 ft.; leaves to 8 in. long with large terminal lobe: *table* W-186*c*
Overdrafts, on a bank B-48
Overdrive, in automobile A-521, *diagram* A-521
Overhand knot K-60
Overhaul. *See in Index* Nautical terms, *table*
Overland, Mo., city 11 mi. n.w. of St. Louis; pop. 11,566: *map, inset* M-319
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Overstreet, Harry Allen (born 1875), psychologist, born San Francisco, Calif.; head of philosophy department, College of City of New York 1911–39; later a conductor of radio program 'Town Meeting of Air' ('About Ourselves'; 'Our Free Minds'; 'The Mature Mind'; 'The Great Enterprise').
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Ov'id (Publius Ovidius Naso) (43 B.C.–A.D. 17?), Roman poet L-131, M-477
Oviedo (*ō-vē-ā'dō*), industrial city of n. Spain, 16 mi. s. of Bay of Biscay; pop. 106,002, with suburbs; university; plundered by French in Peninsular War (1809 and 1810): *map* E-425
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O'vis, the sheep genus of animals.
Ovis poli, or Marco Polo sheep S-136, E-456
Ovule (*ŏ'vūl*), cell which forms embryo plant after fertilization F-184, 185, 186, *picture* F-183
O'vum, an egg, or female reproductive cell H-346
Owatonna, Minn., city 62 mi. s. of St. Paul; pop. 10,191; farming; scholastic jewelry, hand tools, canned goods; state school for handicapped children; Pillsbury Military Academy: *map* M-287
Owen, Sir Richard (1804–92), English biologist, conservator of museum Royal College of Surgeons; superintendent natural history department British Museum ('Memoir on the Pearly Nautilus'; 'Odontography').
Owen, Robert (1771–1858), English Utopian socialist S-215–16
Owen, Ruth Bryan (Mrs. Boerge Rohde) (1885–1954), political leader and lecturer, born Jacksonville, Ill.; daughter of William Jennings Bryan; lyceum and chautauqua lecturer 1919–28; congresswoman from Florida 1929–33; minister to Denmark 1933–36 ('Leaves from a Greenland Diary'; 'The Castle in the Silver Wood').
Owen Falls Dam, in Uganda Protectorate, on White Nile River N-238, *map* E-199. *See also in Index* Dam, *table*
Owens, Jesse (born 1913), Negro track athlete, born Danville, Ala.
performance in Olympics T-163
Owens, Michael Joseph (1859–1923), inventor and glass manufacturer, born Mason County, Va. (now W. Va.); held 45 patents; organized Owens Bottle Machine Co. 1903
bottlemaking machinery G-125, *picture* G-122
Owensboro, Ky., center of farm and mine region and tobacco market. 80 mi. s.w. of Louisville; pop. 33,651; tobacco, petroleum, brick, tile, wood products, canned foods; Kentucky Wesleyan College and Bresica College: *maps* K-30, U-253
Owens Lake, Calif., 12 mi. s.e. of Mt. Whitney; about 18 mi. long and 10 mi. wide; receives Owens River at n. end: *map* C-26
borax deposits B-252
how formed D-152
Owen Sound, Ontario, Canada, port at mouth of Sydenham River, on Owen Sound, inlet of Georgian Bay; in farm and fruit-growing region; pop. 16,423; grain, lumber: *maps* C-69, 72
Owens River, in s.e. California, flows s.e. and s. 175 mi. to Owens Lake: *map* C-34–5
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Owlet moth, moth (family *Noctuidae*) of the cutworm C-532
Owos'so, Mich., city 75 mi. n.w. of Detroit on Shiawassee River; pop. 15,948; beet-sugar industry; iron products, furniture: *map* M-227
Owyhee Dam, in Oregon, on Owyhee River O-410, *map* O-417, *picture* O-409. *See also in Index* Dam, *table*
Ox (plural oxen) C-141. *See also in Index* Cattle
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Brazil, *picture* B-287
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England, Middle Ages, *picture* E-362
Honduras, *picture* C-175
India, *pictures* I-55, 68*b*
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Nicaragua, *picture* N-233
Peru, *picture* L-109
rubber transportation in Far East,

picture R-240
Spain, *picture* S-314
Tasmania, *picture* T-21
Turkey, *picture* T-217
Oxalic acid, poisonous crystalline compound ($C_2H_2O_4$) found in many plants (especially in wood sorrel or oxalis); artificially made by oxidizing sugar, starch, cellulose, etc., by nitric acid, or by fusing caustic alkalis with compounds having oxygen; used in bleaching and dyeing antidote L-244, F-96
Oxalis (*ŏk'sà-lis*), a genus of plants with acid-tasting, cloverlike leaves; flowers red, violet, yellow, or white; both flowers and leaves fold, or "sleep," at night; wood sorrel a type in the United States.
Oxalis family, or **Oxalidaceae** (*ŏks-ăl-ĭ-dā'sē-ē*), a family of plants and trees including the violet wood sorrel, lady's-sorrel or sour grass, yellow wood sorrel, Bermuda buttercup, oka, bilimbi, and carambola; also called wood-sorrel family.
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Costa Rica, *pictures* C-490, T-170*b*
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Trinidad, *picture* W-95
Turkey, *picture* T-217
United States, *pictures* S-308*a*, T-171
Oxenstjerna (*ŏks'ĕn-shĕr-nä*), **Axel Gustafsson, Count** (1583–1654), noted Swedish statesman; became chancellor 1616; showed great ability in directing foreign policy and home government of Sweden; held absolute control in central Germany during Thirty Years' War; guardian of Queen Christina, who opposed him: S-466
Oxeye. *See in Index* Heliopsis
Oxeye daisy, a species of chrysanthemum D-5
Ox family, or *Bovidae,* a subfamily of hollow-horned ruminant mammals, including cattle, bison, buffaloes, and yaks.
Ox'ford, or **Ox'fordshire,** county of s.-central England; 749 sq. mi.; pop. 275,765; farming, manufacturing; county town, Oxford: *map* E-347
Oxford, England, famous university town, 52 mi. n.w. of London; pop. 98,675: O-432–5, *map* B-325, *pictures* O-432–5
university. *See in Index* Oxford University
Oxford and Asquith, Herbert Henry Asquith, first earl of (1852–1928), English statesman, for many years leader of Liberal party; stood for many governmental reforms, one of which deprived the House of Lords of its veto power; sympathized with Irish struggle for home rule; opposed woman suffrage; as prime minister (1908–16) was criticized for his conduct of the government during World War I; created earl in 1925
Lloyd George and L-285–6
Oxford and Asquith, Margot, countess of (1864–1945), English writer, wife of first earl of Oxford and Asquith; her autobiography made sensation in European society; ("The Autobiography of Margot Asquith'; 'Places and Persons'; 'Octavia'; 'Myself When Young'; 'More Memories').
Oxford Down, a breed of sheep S-138
'Oxford English Dictionary, The' R-88*f*
Oxford Groups, informal associations of the followers of Buchmanism. *See in Index* Buchmanism
Oxford Movement, a religious movement in Anglican church after 1832; aimed to restore to Church of England some doctrines and practices abandoned during the Reformation
Newman's part N-168
Oxford Reformers, in English Renaissance M-391
Oxfordshire, county, England. *See in Index* Oxford
Oxford University, Oxford, England O-432–5, *pictures* O-432–5
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Christmas, boar's head ceremony C-299
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religious restrictions removed G-118
Rhodes scholarships R-144
Ox Hill, battle of. *See in Index* Chantilly, Va.
Ox'idase, ferment that produces oxidation B-146
Oxida'tion, chemical union of any substance with oxygen or other negative element or radical C-216
alloys prevent A-172
animal heat and energy caused by B-146, L-224*d*
candle flame and Bunsen burner B-352–3, *picture* B-353
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rust (slow oxidation) R-296–7
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Oxides (*ŏks'īdz*), *compounds of oxygen with some other element* M-262, 265
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nitrogen N-240: nitric oxide F-317, N-240; nitrous oxide A-246
silicon S-179
sulfur S-448
tin T-137
zinc Z-351, P-40
Oxidized cellulose C-163
Oxnard, Calif., city 53 mi. n.w. of Los Angeles; pop. 21,567; fruits and vegetables; processed food; sugar refinery: *map* C-35
Oxus River, Asia. *See in Index* Amu Darya
Oxyacet'ylene blowpipe, or **oxyacetylene torch** A-7, *picture* A-8
Oxygen (*ŏks'ĭ-jĕn*), a gaseous element O-435–6, *tables* P-151, C-214. *See also in Index* Oxidation; Oxides
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yeast plants extract Y-336
Ox'yhemoglobin, combination of oxygen and hemoglobin found in arterial blood B-208, B-146
Oxyhydrogen flame, used in blowpipe to cut metal H-459
Oyama (*ō'yä-mä*), **Iwao, Prince** (1842–1916), Japanese field marshal; captured Port Arthur in war with China; commander in chief in Russo-Japanese War; defeated Russians at Mukden, Manchuria.
Oyster O-436–40, M-333–4, *pictures* O-436–9
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Oyster Bay, N.Y., residential center and summer resort on Long Island, 30 mi. n.e. of New York City; pop. 5215: *map, inset* N-204
Sagamore Hill, home of Theodore Roosevelt R-226
Oyster catcher, a shore bird of the stilt family; long-legged, wedge-pointed, red bill; common American species (*Haematopus palliatus*) 18 to 20 inches long; brown with black head and neck; feeds on oysters, clams, and mollusks; also called mussel picker and sea pie.
Oyster plant. *See in Index* Salsify
Oyster-shell scale S-54
Oz, Land of, an imaginary fantastic land, described by L. Frank Baum in 'The Wonderful Wizard of Oz' and other 'Oz' books for children.
Ozalid print B-212
Ozama (*ō-sä'mä*) **River,** in Dominican Republic; rises in central range and flows about 65 mi. e. and s. to Caribbean Sea at Ciudad Trujillo: *picture* D-123
Ozark (*ō'zärk*) **Mountains,** a low plateau in Mississippi Valley between Missouri and Arkansas rivers O-440, *maps* U-250, 274, M-312, 318–19
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Ozarks, College of the, at Clarksville, Ark.; Presbyterian; founded 1834 at Cane Hill, Ark.; moved to Clarksville 1891; arts and sciences.
Ozarks, Lake of the O-440, *map* M-318. *See also in Index* Bagnell Dam
Ozea, Mount, in Greece. *See in Index* Parnes, Mount
Ozone (*ō'zōn*), a very active form of oxygen O-436
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